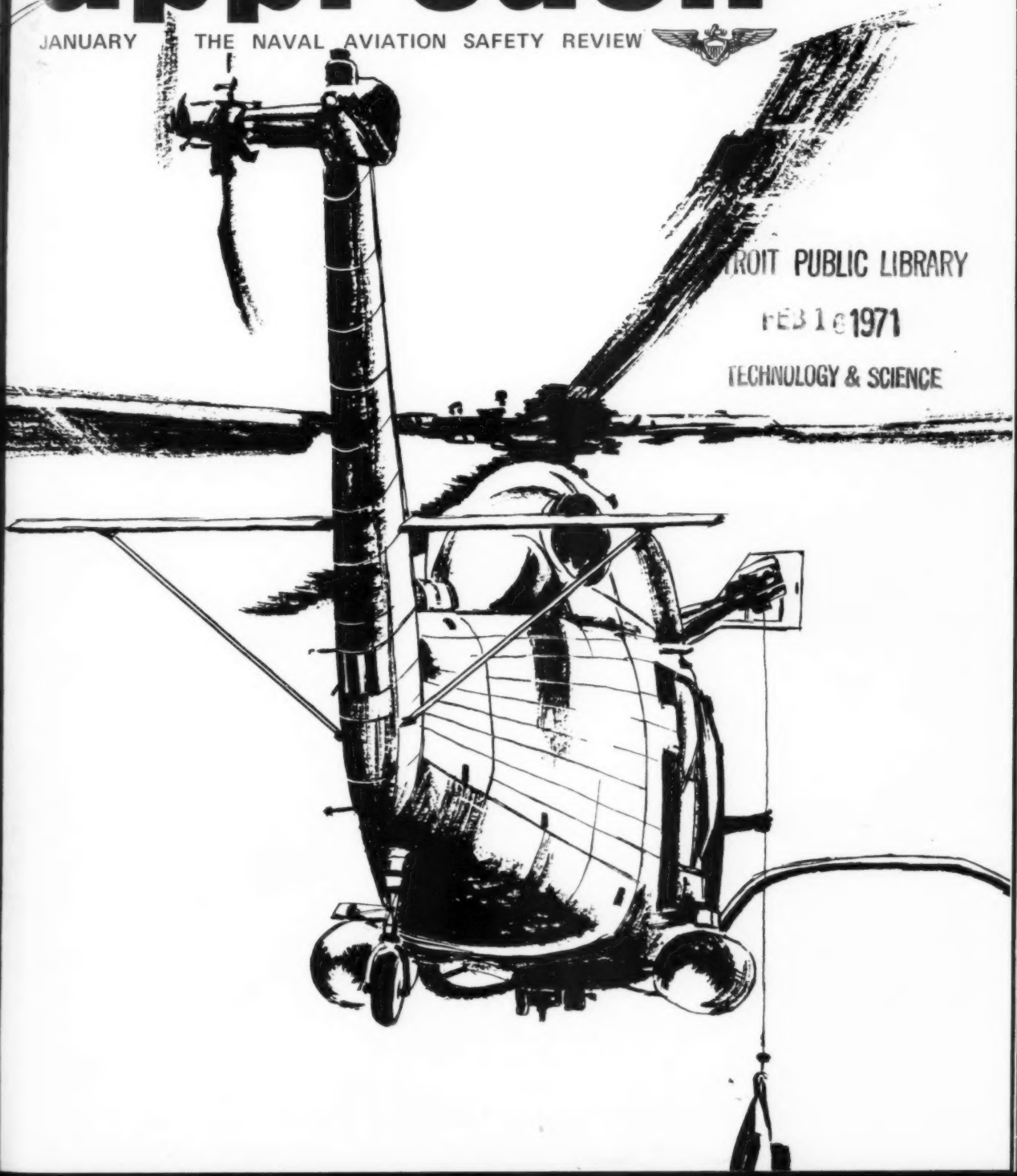
A Naval Safety Center Publication

approach

JANUARY THE NAVAL AVIATION SAFETY REVIEW



THE DEPUTY CHIEF OF NAVAL OPERATIONS (AIR)
WASHINGTON

New Year's Challenge

IMPROVED Aviation Safety is the goal. How we go about it is the program. First let's define it. Aviation: the art or science of flying airplanes. Safety: reducing danger and harm. The goal is to reduce the danger associated with the flying of airplanes.

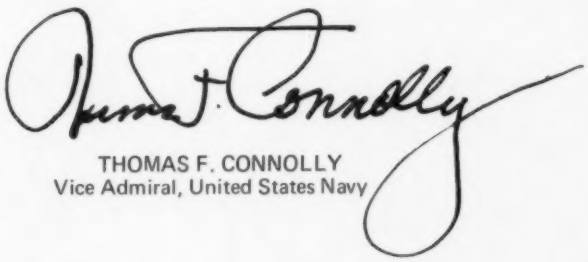
How do we go about it? It starts with identifying the dangers. The NATOPS manual does that. Safety Surveys help, as do the vital words published each month in APPROACH and MECH. Statistics help, for example, when they tell us that personnel error cost us $205,000,000 last year and took 162 lives, and when they tell us that most errors occur where people disregard established and published rules and procedures.

With the dangers and risks identified and catalogued, each must be studied and comprehended so that appropriate actions can be taken to reduce them all to a minimum; good actions such as education (getting the word), training and practice, supervision, even major policy decisions as necessary. Communication of correct information is the solution, and leadership is the means of making it happen.

Supervisors throughout all echelons of command set the example by knowledgeable leadership and determination to greatly reduce if not eliminate the *unnecessary* hazards of aviation. Flight leaders, pilots, crewmen and maintenance personnel – officers and enlisted – will then have standards for judging their own performances. Safety is everyone's business and everyone is involved in its achievement. No individual can dodge his personal responsibility in meeting this goal. Each of us must become fully aware of our responsibility.

To sum up, achieving aviation safety requires thoughtful study, careful analysis, sound decisions, meeting standards set, all adding up to fine personal performance at each level.

And so to all of you who are directly involved with and responsible for Naval Aviation performance, whatever your role, achieving a higher level of aviation safety this year must become your challenge. Let me make it more personal. Can each of you prevent *one* accident this year? I believe you can.



THOMAS F. CONNOLLY
Vice Admiral, United States Navy

DISTRACTIONS

DISORIENTATION

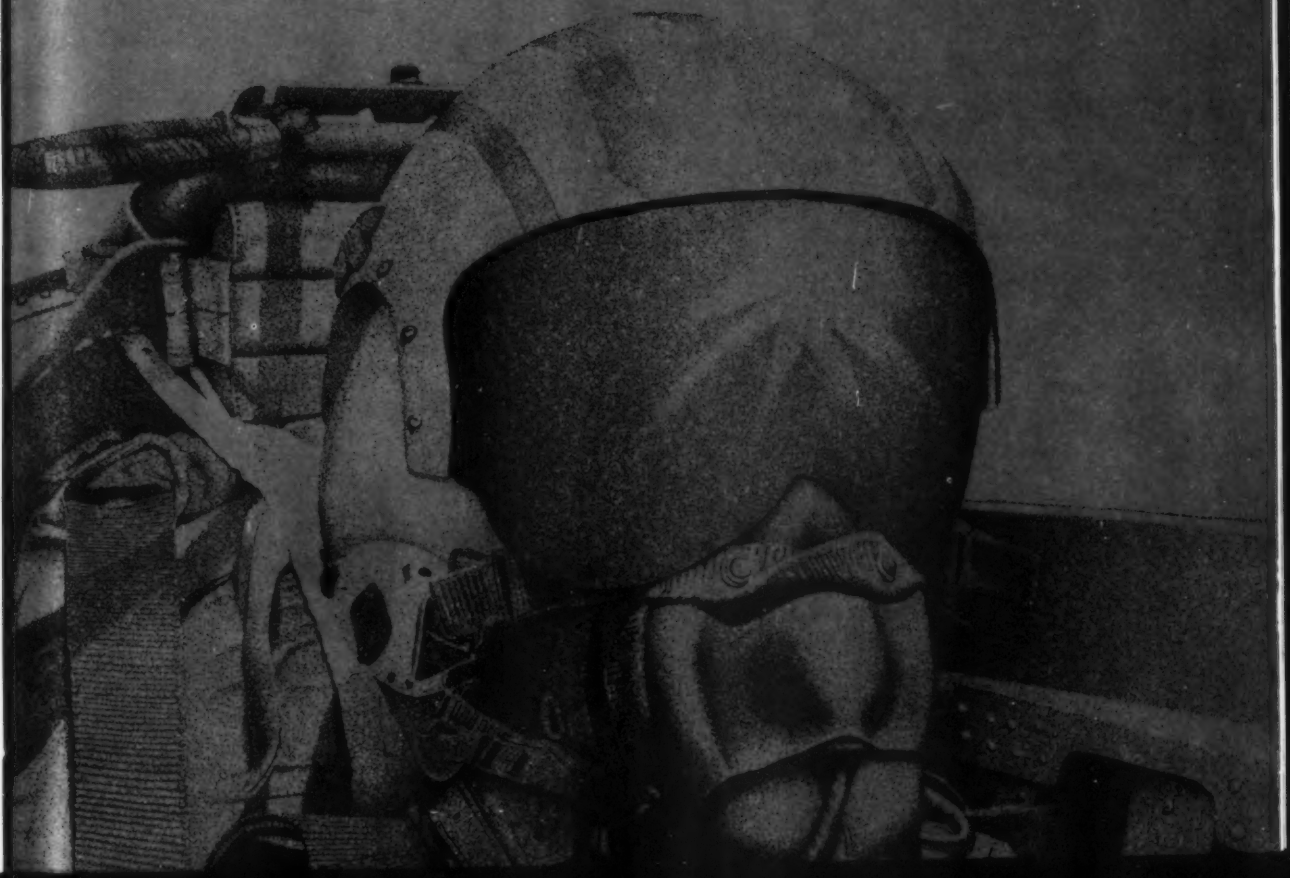
SPATIAL disorientation is a very hazardous phenomenon associated with aviation operations. It can occur in just about any phase of flight operations, in good weather or bad, in darkness or in conditions of good visibility. It is unfortunate but there is little that can be done to prevent it because it is a normal physiological response of the human body to various visual or physical stimuli. However, by learning as much as possible about the situations which produce disorientation, the pilot becomes better equipped to deal with its inherent dangers.

One area of flight operations in which disorientation has proven to be a considerable hazard is the night field landing pattern. This article discussed two accidents which occurred during this phase of aviation operations. In each of these accidents, there were several common factors:

- Each aircraft was lifting from the runway after a touch-and-go landing.
- In each case there were few or no lights on the ground to provide ground references.
- Each of the pilots was distracted by other traffic, either already in or entering the pattern.
- In the two accidents considered, the pilots are known to have fixed their attention on the lights of other aircraft.

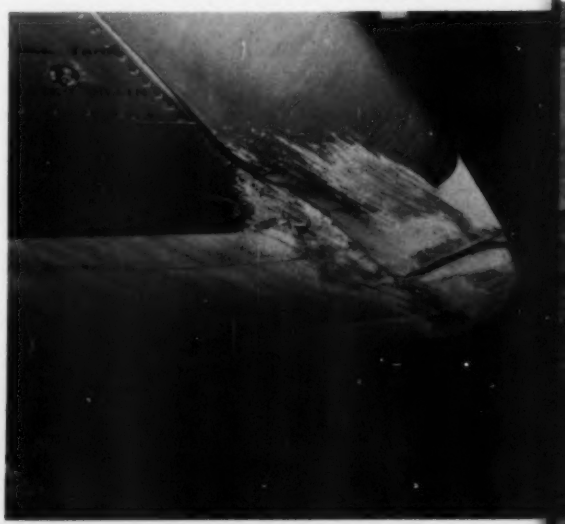
In one case, a student pilot flying a TF-9J aircraft had just completed his sixth night touch-and-go landing. Upon reaching 600 feet indicated (field elevation 186 feet), he transitioned to level flight, preparatory to commencing a climbing turn downwind. At this time the tower informed him that he had traffic at 12 o'clock, same course. The student sighted the traffic and judged

in the Night Field Landing Pattern



This aircraft received substantial damage when the pilot flew into the ground during night landing practice . . . .

and this one received only a scraped wingtip . . . .



it to be at about the same altitude although in reality it was 800 to 900 feet higher. The traffic was, in fact, a flight of two aircraft in the break at 1500 feet MSL.

As the traffic broke, the student incorrectly interpreted the two diverging lights of the breaking aircraft as a rapid closure rate of a single aircraft in a right turn. Thinking a mid-air collision to be imminent, the student took evasive action by turning left. The student pilot's next realization was that he was rapidly approaching the ground. His reaction was to add full power and rotate the aircraft nose up; however, this action was too late to avoid contact with the ground. The aircraft impacted the ground immediately upwind of the runway overrun barrier. Initial contact was on the left wingtip in a nose-high, left wing down attitude. The impact tended to level the wings and the next contact with the ground was made by the tail skag and port main landing gear, followed by the starboard main landing gear. After about 200 feet of travel the nose gear

touched down and after a total of 320 feet of travel, the aircraft became airborne. The student pilot climbed to pattern altitude, turned downwind and made a normal but fast approach to a final landing. Happily, the pilot was uninjured and the aircraft received only limited damage.

This accident involved both distraction and disorientation. The student pilot was distracted from the duties of flying his own aircraft by the requirement to check overhead traffic. This should not ordinarily pose any special problems but in this case the student became disoriented in that he was unable to correctly comprehend his own position in relation to the overhead traffic. Because of this confusion the student's attention became fixed on the aircraft overhead to the extent that his scan broke down and he flew into the ground. The aircraft accident board attributed this to the student pilot's limited experience, the darkness of the night (because of cloud cover), little or no visible horizon and the lack of any lights on the ground for a distance of several miles off the upwind end of the runway.

This is one of several similar accidents which have occurred in the Training Command during recent years. Corrective action to prevent such accidents has included changes in traffic patterns to reduce the chance of distraction and removal of potential traffic conflicts. Increased use of radar, improved lighting, increased monitoring of aircraft in the pattern by experienced personnel on the ground and increased emphasis on instrument procedures at night should significantly decrease the accident potential.

Relatively inexperienced student pilots in the Training Command may be the most susceptible to distraction and disorientation during night flight but it is not exclusively a Training Command problem. Reports to the Naval Safety Center indicate distraction/disorientation is a problem throughout the Fleet as well.

An A-7A pilot launched shortly after midnight on a night FMLP flight. Shortly after takeoff, the pilot called for clearance into the break. The tower cleared the pilot as requested and advised him that the runway lights were off and the flight deck lights were on.

The pilot made a normal break, taking interval on an A-3 already established in the pattern. He called the abeam position on his first pass. He did not have his external lights set up correctly when abeam, but he corrected this and flew an angling approach. As a result he was not set up on the ball and executed his own waveoff. He turned downwind for his second approach, called the ball and continued in for a touch-and-go landing. During the final seconds of his approach, radio traffic was heavy with two more A-7s calling initial and a technique discussion taking place between the LSO and the A-3 pilot. The A-7A turned downwind for his third pass (his interval was still the A-3) and was approaching the abeam position when the flight of two A-7s broke behind him. A second section of A-7s entered the break as he flew his third approach to a successful touch-and-go landing. His touchdown, power application, rotation and climb were normal and the tower advised him after liftoff that his interval was a flight of two breaking upwind. He did not acknowledge the transmission and was observed to transition from a

but this aircraft was destroyed and the pilot was fatally injured.

climb to a dive and his aircraft impacted the ground in a wings-level attitude just off the left-hand edge of the runway. The aircraft exploded on impact and burned with fatal injuries being sustained by the pilot.

During the investigation it was learned that the aircraft had had an ASN-50 (attitude and heading reference system) gripe on the preceding flight. This gripe had been corrected by replacement of the main gyro unit. The system had subsequently ground checked OK. The board retrieved the gyro which was in the aircraft at the time of the crash. In spite of the damage, it functioned properly. The board noted that although there is no established policy on the subject, it is an accepted practice on the part of most squadrons to direct that an aircraft, after a primary flight instrument failure, be flown in day VFR conditions before being scheduled for a night or instrument flight.[1] Regardless, the board did not consider the attitude indicator to be a factor in this accident. Rather, the board concluded that the accident occurred because the pilot allowed his scan to break down at a point where an accelerated scan was demanded. The board stated:

"Inattention to the flight instruments for a brief five to six seconds while transitioning was sufficient to cause the aircraft to crash. Searching for his interval and interpreting relative movement, distraction induced by extraneous transmissions during his three approaches, disruption of his interval with the arrival of additional aircraft, fatigue after a long day and a very demanding earlier flight all could have combined to cause a scan breakdown. The lack of a visible horizon made it a necessity to fly primarily on instruments throughout the majority of the approach. Failure to maintain his instrument scan in a critical transition phase proved fatal to the pilot."

The following points are obvious from these accidents:

• First, distractions in the landing pattern are potential hazards, particularly to the relatively inexperienced pilot. Unfortunately, they cannot be eliminated, though they can be minimized. One way to do this is to exercise good radio discipline in the pattern. This is particularly important when LSOs or RDOs are using tower frequency. Another way to minimize the bad effects of distractions caused by other traffic in the pattern is to insure that all concerned have a thorough understanding of the traffic pattern in use. The pilot of an aircraft taking off from a touch-and-go landing is not likely to become unduly concerned about traffic in the break if he is adhering to his assigned altitude and knows that he has 500 to 1000 feet altitude separation from the breaking traffic. Furthermore, the knowledge that the overhead traffic is travelling at a higher rate of speed should help the pilot visualize his relationship to the

[1] A recent safety UR/aircraft incident report stated that the primary attitude indicator of a single-piloted aircraft had been replaced prior to a night flight. After a catapult launch, the pilot rotated normally but noted that the instrument was indicating a nose-down attitude. He rotated further and quickly cross-referenced his other instruments which indicated that the aircraft was, in fact, climbing even though the primary attitude instrument indicated further nose down. The pilot correctly determined that the indicator was giving reverse indications and successfully completed the flight using partial panel procedures.

Investigation of the incident indicated that cross-connection of two of the pitch stator windings within the indicator was the most probable cause of the malfunction.

A COMNAVAIRPAC message issued subsequent to this incident noted that only good partial panel procedures by an experienced aviator prevented a disaster. The same message directed that henceforth all PACFLT activities involved in the operation/maintenance of aircraft equipped with a single primary attitude indicator issue a local directive to require a test flight after the installation of a primary attitude indicator. It was also recommended that NAVAIRSYSCOM incorporate this requirement in NAVAIRINST 4700.2.

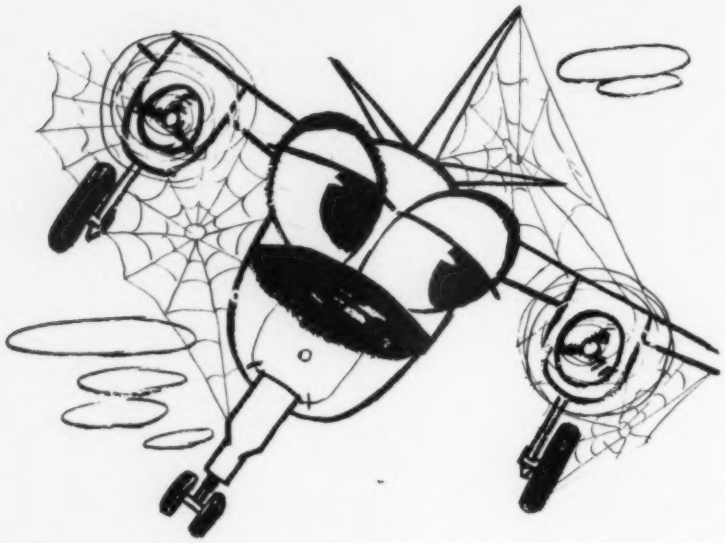
traffic. The most important point here is that the pilot is much less likely to become confused if he has a good understanding of where the other aircraft in the pattern *should* be in relation to his own aircraft.

• Secondly, even if there is doubt and confusion about the relative positions of aircraft in the pattern, the pilot must not fix his complete attention on *any* lights outside the cockpit. This is especially true when there is little or no horizon or when there are few or no ground lights for reference. Whenever a pilot tries to orient himself on a single light in a black background, he literally does not know which way is up, particularly if the light is moving.

When a pilot becomes disoriented in flight, the usual prescription is for the pilot to glue himself to his instruments until he overcomes the feeling of disorientation. In such cases, the pilot is frequently cautioned against attempting to fly partially VFR and partially on instruments. Unfortunately, in a night VFR traffic pattern where traffic separation must be maintained visually, it is not possible for a pilot to "glue himself to the instruments" with the exclusion of all outside reference. The fact is, the pilot must divide his attention between his instruments and outside references (the lights of other aircraft); however, he should continue to depend primarily on his flight instruments for orientation. A good scan is absolutely essential in doing this. When a pilot is observing the lights of another aircraft and it appears that there is some danger of collision, it is natural for the pilot to continue close observation of the aircraft in order to determine proper evasive action. However, as already stated, the pilot must resist the inclination to fix his complete attention on the lights of the aircraft to the exclusion of his instruments since this will result in a breakdown of his scan and may result in a collision with the ground. Visualize, if you will, an aircraft just lifting off the runway at night. There are no lights on the ground for reference and there is no visible horizon. In such a case, if a pilot fixes his attention on an aircraft at his 12 o'clock position, in the break, the pilot can easily (and unknowingly) pull the nose of his aircraft up to an attitude where the aircraft in the break will appear to be level. The only way for the pilot to combat such a false sensation is for him to be able to determine his attitude in relation to the ground/horizon. In the absence of a natural horizon or good ground reference, the only way he can do this is by referring to his instruments.

There have been a sufficient number of accidents in the night field landing pattern involving distraction/disorientation to justify concern on the part of all pilots, regardless of experience. If you find yourself in the night landing pattern on a dark, moonless, horizonless night, be alert to the hazards. Avoid distractions, beware of the lights and above all, keep up a good instrument scan. It all goes back to the basics – fly the aircraft first and take care of other matters as time permits. ◄

Pilot Proficiency



MY COPILOT and I had just completed a 5.4 hour flight and were leading a formation of three S-2s back to home base. Upon arrival at the field the tower was contacted and clearance to enter the pattern was granted along with the request to call base with the gear. The approach was uneventful until reaching the 90-degree position at which point the low fuel lights came on. We knew we had 600 pounds of fuel on both sides and realized that the lights illuminated due to the aircraft's attitude and angle-of-bank; therefore we weren't concerned. However, this did cause our thought pattern to be broken and we were on short final before it dawned on us that we had not called and asked for clearance to land. A quick voice report was made and clearance was granted on a very short final. The landing was normal but we came within a few seconds of landing without clearance.

What caused this near flight violation? Both my copilot and I have over 1100 hours total flight time and 800 hours in model. I feel that it was caused by the greatly reduced number of hours we have been able to fly lately. It was my first hop in 19 days and only my second in 29 days. It was my third landbased flight in 48 days. My copilot had his last hop 15 days prior to this flight. Both of us had about five hours in the last month before this hop.

Although this was a minor incident I feel that it may very well be the start of a trend and lead to a higher accident rate in the near future. Needless to say my crew has begun our own refresher program and understand more fully the need to stay with the aircraft until it is chocked and shut down.

The reduction in flight time could cause an increase in the aircraft accident rate but this can be thwarted if aviation units will make every effort to accomplish the following:

- *Thoroughly reevaluate each pilot's flight time requirements. Normally the inexperienced pilot will require more hours in the air than the experienced pilot.*
- *Make every 60 minutes flown produce one hour of effective training.*
- *See to it that pilots fly regularly rather than sporadically. Long intervals of time between flights do not allow them to maintain peak proficiency.*
- *Insist on a thorough ground training program.*

We at the Naval Safety Center realize that it won't be an easy task. Yet we are mindful of the fact that the aircraft accident rate declined last fiscal year for the first time since 1967 and in spite of reduced operating funds. It will require a concerted effort on the part of all naval aviators but that rate could be lowered again this fiscal year. Thus far you're off to a good start.

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT, PREVENT AN ACCIDENT

You've Got It

TWO HACs (1000-hour types) and two copilots (50-hour types) prepared for a weekend cross-country flight. While the HACs checked the weather and filed their flight plans the copilots picked up the gas packets, bags, and conducted preflights of their birds. Each HAC went through final checks as the copilots copied

clearances. The HACs had decided on an IFR section climbout through a thin overcast to VFR on top.

After takeoff and while turning to assigned heading both aircraft entered clouds at 500 feet. The copilot of the lead aircraft advised his HAC that he had lost sight of No. 2. Almost simultaneously the HAC overshot his assigned heading and reported a bad case of vertigo. He turned over control of the helicopter to the copilot who returned to wings level and continued to climb but it wasn't long before the copilot also developed vertigo. The two victims of vertigo discussed their problems while the helicopter flopped about between ±20 degrees of nose attitude and from 0 to 125 kias. Eventually the problem was solved by having the HAC fly the helicopter while the copilot called out the scan until VFR conditions were reached. The problem was due to lack of brief and the lack of proper scan prior to entering the clouds.

Shookmouse

Iron bars do not a prison make nor 1000 hours a HAC. If that incident wasn't a midair in the making I'm a striped baboon. Instrument flying, especially in a helicopter when the HAC can't hack it, is no time for section flying. Instrument flying is for pros who know what they are doing, are comfortable doing it and do it precisely and proudly. Someone better see to it that this HAC receives about 10 hours of dual instrument refresher time – quickly.

Not Too Pooped To Pop

WHILE on a routine night dipping hop in an SH-3 the copilot noticed the No. 1 engine oil pressure decreasing. He immediately told the aircraft commander who decided to break hover and return to homeplate.

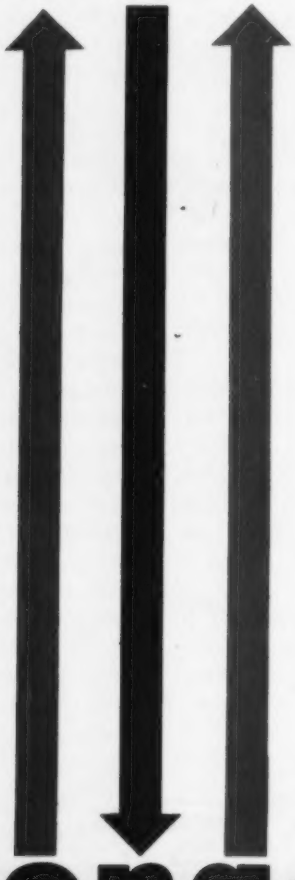
A climb to 1000 feet was accomplished and a turn for home made with the copilot flying, the HAC troubleshooting and both of them watching the decreasing oil pressure. About 10 miles out fuel dumping was commenced and the tower contacted for a straight-in approach. When the oil pressure reached 10 psi the No. 1 engine was secured to avoid a possible seizure. Fuel dumping was secured prior to crossing the coast line. A flawless single-engine landing was executed and the pilots taxied their steed to the line and secured the rotors and remaining engine.

The next day the intrepid aviators returned to the squadron readyroom and related to their mates the story of the previous night – knowing full well that they had been "NATOPS perfect" in their handling of the emergency. A subsequent check of the engine revealed plenty of oil and that a popped circuit breaker had been responsible for their emergency. Apparently the HAC and the copilot had forgotten step one of the NATOPS procedures – check oil pressure circuit breaker IN. Tsk, Tsk boys; how your hero image has faded. Do you check your circuit breakers in?

Circuit Breakermouse

Well now this proves one thing for sure. When you are blessed with more than one engine, either one will usually get you back home OK if you don't compound the emergency. The point, not to be missed after the initial surge of adrenalin, is to review the NATOPS procedures step by step using the challenge and reply system to ensure that you haven't forgotten/overlooked something. We can live with embarrassment but not with bent birds. ◄

FROM TIME TO TIME an aircraft engages emergency runway arresting gear in the *wrong* direction. When this occurs, the aircraft is invariably the loser. Two such cases have recently been reported to the NAVSAFECEN. One involved a T-1A aircraft and the other involved an S-2E. In both cases the pilots experienced emergencies shortly after takeoff and were in the process of making emergency landings when the accidents occurred.



Wrong-Way Arrestments

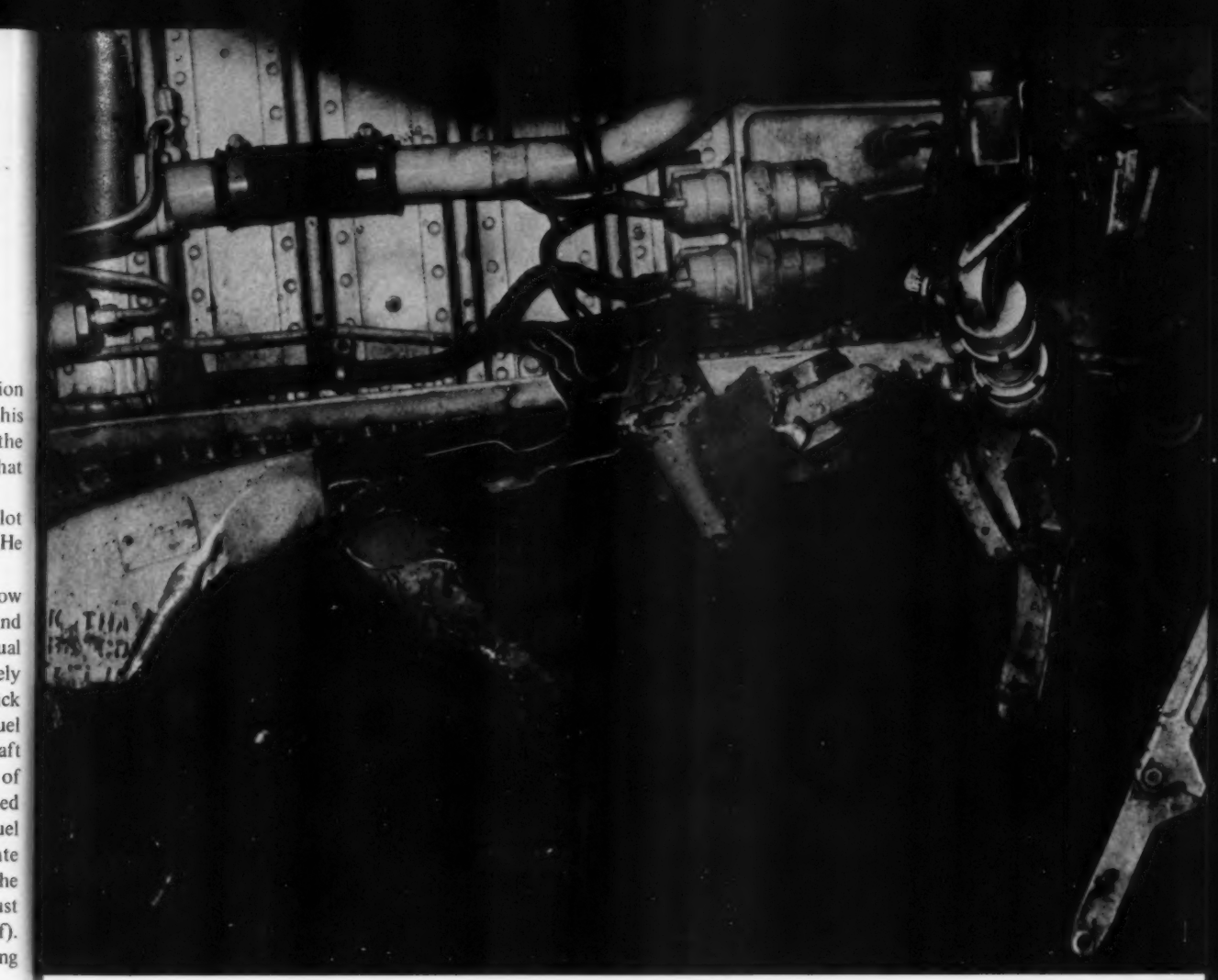
The T-1A Accident

The pilot filed an IFR flight plan for a destination several hundred miles away. After completing his preflight, he taxied to the warm-up area adjacent to the takeoff end of the runway. He was then informed that there would be a delay in his IFR clearance.

After waiting for about 20 minutes the pilot canceled his IFR flight plan and decided to go VFR. He then contacted the tower for takeoff.

After takeoff he climbed to 500 feet, began a shallow left turn and continued climbing at 165-170 knots and 30 degrees of flaps. At 1500 feet, he heard an unusual noise from the aircraft's tail section, immediately banked the aircraft toward the airport and made a quick glance at his engine instruments noting unsteady fuel pressure, normal EGT and 100 percent rpm. Aircraft position at this time was about 2-3 miles from the end of the runway from which he had just taken off. He called the tower, declaring an emergency, stating he had fuel pressure problems and was requesting an immediate landing. He was cleared to land on any runway and he elected to land on the runway from which he had just taken off (but in the opposite direction from takeoff). From this point on, he concentrated on his landing approach and did not monitor his instruments.

He began his approach with about 1200-1500 feet of altitude, 150 knots airspeed, gear up, flaps at 30 degrees and one to two miles from the runway threshold. As he continued his approach, holding 140-150 knots airspeed, he felt the power "unwinding" but, in retrospect, he believes this may have been due to the fact that he was also retarding the throttle at this time. When on short final, with 300-400 feet of altitude he lowered his landing gear, gangbarred the fuel switches and secured the engine. At about 150 feet of altitude and just short of the runway overrun, he lost aileron boost and the right wing dropped. He managed to level his wings and touched down at 140 knots on the overrun about 300



feet *short* of the MA-1A emergency overrun gear. *He was unaware at the time that the MA-1A was not designed to be engaged in this direction.* This was unfortunate because he had sufficient speed and altitude to avoid touching down in front of the MA-1A gear if he had recognized the need to do so. Upon touchdown, the aircraft rolled through the MA-1A webbing and picked up the overrun cable on the main mounts. The cable broke and the aircraft continued for 7000 feet down the runway.

The underside of the aircraft was extensively damaged when the overrun cable engaged the underside of the aircraft (see photo). Because of the extensive damage and the age of the aircraft, it was decided to strike and salvage the aircraft rather than repair it.

Accident investigators concluded the unusual noises and fuel pressure problems which the pilot experienced were the result of mismanagement of the fuel system. Nevertheless, the problems were real and the pilot was justified in landing the aircraft as soon as possible. He did a very creditable job in getting the aircraft back to the runway and no doubt could have completed the landing without damage to the aircraft if only he had understood the limitations of the emergency arresting gear installed on the runway.

The S-2E Accident

After a routine preflight, taxi and runup, the pilot was cleared for takeoff on runway 23. Shortly after takeoff the port fire warning light illuminated. At this time, the pilot reduced power on the port engine in order to determine if the warning light was caused by a cracked exhaust stack. The crewmen were advised of the warning light and asked to check the port engine for visible signs of fire. They reported (erroneously, as it

turned out) that the engine appeared to be on fire. The pilot advised the tower that he had a fire in the port engine and intended to land on runway 34, the first available runway. He was cleared by the tower to land.

After a normal touchdown near the end of the runway, the pilot directed the copilot to lower the tailhook in order to take the abort gear located near the approach end of runway 34. (This chain gear is located 1365 feet from the approach end of runway 34 and is, in reality, the abort gear for runway 16.) Shortly after the tailhook engaged the arresting gear the cable parted at a point near the starboard side of the runway. The longer piece of the cable then whipped over the fuselage and as the aircraft continued down the runway, the cable tore the entire empennage from the aircraft (see photo). As the empennage separated, the aircraft began a counterclockwise skid and came to rest on the left side of the runway. There were no injuries.

The subsequent investigation determined that there had been no engine fire. The fire warning light had been activated when the bolt holding the exhaust clamp on No. 8 cylinder backed off, permitting a short section of the exhaust stack to work free. The pilot, of course, *thought* he had an engine fire and was justifiably concerned with relanding the aircraft as soon as possible. On short final to the landing the pilot had become concerned when he saw another aircraft crossing the runway at a point about 1900 feet from the approach end. He had then called the tower and asked them to "get that aircraft off the runway." By the time the aircraft touched down the other aircraft had cleared the runway. The pilot later stated that his main concerns as he touched down were, first, to avoid hitting the other aircraft (although it was already clearing the runway) and second, to get his own aircraft stopped as soon as possible and, preferably, in the vicinity of the crash truck which was parked about 1900 feet down the runway. With these ideas in mind, he called for the tailhook thinking he could successfully engage the abort gear for runway 16. Both the pilot and copilot candidly admitted that at no time did they think they would be engaging the gear in the wrong direction.

Questioning of other pilots in this squadron revealed that many of them were not sufficiently familiar with the operation of arresting gear in use at this station or at other fields. Individual members of the accident board expressed the opinion that this situation undoubtedly prevailed in other commands as well.

Study Recommended

In the cases just recounted, the accidents involved engagement of field arresting gear in the wrong direction. Knowing the directional capabilities of arresting gear is important, as these cases illustrate, but this is only part of the information which pilots should have. A knowledge of engagement speeds, weights and limits of off-center engagement is also important.

The importance of emergency field arresting gear to safety can hardly be overestimated. During 1967, for example, there were a total of 2621 recorded emergency arrestments. It follows that naval aviators should be intimately familiar with the types of arresting gear available at fields from which they operate. The FLIP IFR Supplement, naval air station operations manuals and aircraft recovery bulletins are important sources of information. In addition, a comprehensive article on the subject was printed on pages 32-40 of the May 1969 APPROACH.

Take the time to learn all there is to know about the operation and use of emergency field arresting gear. It could make the difference between a safe landing and an accident.

A Page from the ASO's Songbook

Show Me The Way to Go Home

Show me the way to go home,
'Cause I'm lost and I'm almost outa' gas,
I had a tacan lock-on 'bout an
hour ago,
And the air was smooth as glass.

Now I'm in one heck of a storm
And my NavAids have begun to search and roam –
So if anyone can hear me as I'm
stumblin' along,
Please show me the way to go home.

They told me that bumpers were enroute
But I figured I could hack it VFR
And I knew my tacan was a
little bit off
But I wasn't gonna' go too far.

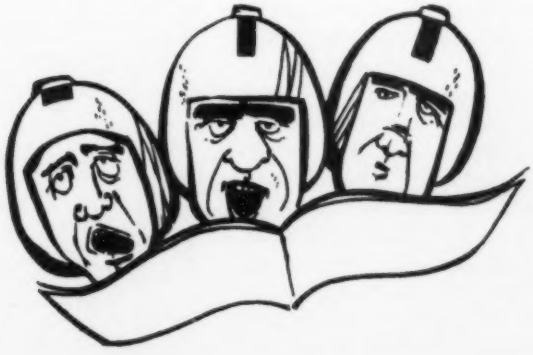
So off I boomed into the blue
With the thoughts of San Francisco in my dome.
Now the clag is all around me here at
thirty-nine grand.
Please show me the way to go home!

"Navy Jet squawking Mayday do you read,
This is San Francisco Center in the blind."
"I can read you loud and clear, can you give
me a steer.
I'll take any field I can find."

"Roger, Navy jet, we've got you locked on
Alameda's dead ahead with clear and 10,
You can start a letdown now and level off
at eight thou,
GCA will take you right in."

"Many thanks, Center. Field is in sight.
Shifting tower and I'm entering the break,"
Man, those center guys were really right
on the ball,
They knew just what steps to take.

And I've taught myself a lesson or two
I will plan my flights much better from now on.
All the gages I will check as well as weather
all 'round
So that I can always find my way home.



Bye, Bye, Birdie

IT WAS late afternoon on a hot and humid day at NAS Podunk when the *Skyhawk* driver walked to the squadron flight line to commence preflighting his assigned aircraft. The exterior looked good so the pilot manned the A-4C and after start conducted a normal poststart check which revealed no discrepancies. He then taxied to the runway and while awaiting ATC clearance performed the takeoff checklist. Upon receiving takeoff clearance the pilot shifted to departure control, taxied onto the end of the runway and executed engine runup. The engine instruments read normal so he commenced takeoff roll down the 8000-foot runway. At 130 kias and after 4000 feet of roll the pilot rotated the aircraft. The bird rose slightly but was unable to achieve altitude and continued down the runway with the pilot quite convinced that it would fly. As a result he made no attempt to abort the flight. At approximately 1100 feet past the runway end the A-4 settled back to the ground and the pilot initiated ejection. After rolling another 2000 feet the aircraft impacted some railroad tracks, stopped and burst into flames. The *Skyhawk* was a total loss. Meanwhile the pilot's parachute had blossomed and he landed in a marshy area unhurt.

Now that we have presented a brief description of the mishap, let's go back and reconstruct the events and causes which led to it as determined in the AAR and subsequent endorsers thereto.

This scheduled cross-country was the pilot's first

land-based flight since returning from a long carrier deployment. Although not mentioned in the pilot's statement, the board concluded that he had attempted to make a short field takeoff without adequate preflight preparation. In addition, he made several errors in judgment during the takeoff roll which led to the mishap. These conclusions were substantiated by the facts revealed below:

- The pilot failed to compute takeoff distance and line speed as required by NATOPS. This computation would have disclosed to him that the proper liftoff speed in accordance with the aircraft performance charts should have been 149 kias. The nose rotation speed would have been 10 knots less than that, or 139 kias. Therefore the pilot rotated the A-4C nine knots below the required speed.
- When reaching 130 kias the pilot slowly moved the stick to the full aft position and held it there expecting the aircraft to fly off in a light buffet shortly after rotation.
- In his conversation with the board the pilot stated that he had trimmed the A-4 to the six-degree nose-up position prior to commencing the takeoff roll. This is the proper setting for normal takeoff. The postaccident maintenance investigation revealed that the elevator was intact and the stabilizer trim was set at the full 11-degree nose-up position. There was no indication of runaway trim; therefore it is possible that the pilot inadvertently trimmed the aircraft to the full nose-up position during the takeoff roll or subsequent to rotation. In effect the A-4 became a high-speed *roadrunner* with such excessive nose-up trim and nose-high attitude that the aircraft would never have become airborne without the pilot lowering the nose or jettisoning the external fuel tanks.
- At no time did the pilot attempt to abort the takeoff. On two occasions prior to reaching the arresting gear he was queried by the tower operator as to whether he intended to drop his hook. These transmissions were heard by other pilots flying in the area. The pilot stated that he thought he was too fast for the gear and was still convinced that the aircraft would fly.
- Three experienced naval aviators who had observed the aircraft during the takeoff attempt stated that the A-4 main mounts never left the runway during the entire takeoff roll.

This is an example of a senseless and absolutely avoidable accident, attributable only to the pilot's poor judgment and failure to follow prescribed NATOPS procedures. Attempting a minimum roll takeoff using improper procedures on the first flight since returning from a protracted deployment and under conditions of high temperature, maximum fuel load and a downwind component is not very smart. However, it should be noted that the preceding conditions were within the capability of the aircraft had the pilot planned his takeoff in accordance with NATOPS.

The pilot involved in this mishap is not an inexperienced nugget. He has over 1000 hours of flight time with over 700 hours in this model. He is considered an above average pilot by his C.O. and has had no prior mishaps. Why then would a pilot of this caliber forget on one flight all he should have learned and remembered? Could it be that old bugaboo *complacency* rearing its ugly head? After a pilot's been shooting off a carrier deck for several months he just might think that a landing field with an 8000-foot runway is duck soup. This particular pilot summed it all up in the last sentence of his statement, "This accident could most likely have been prevented by strict adherence to NATOPS procedures." You flyboys about to return to dry land after lengthy deployments (and all others) take note. Don't let a mishap like this one happen to you.

Short Snorts

Minds are like parachutes, they only function when they are open.

Thomas Dewar

It Doesn't Pay to Rush

AN A-4E pilot was preparing to launch from a CVA as the wingman on a practice bombing and rocket flight. The preflight was normal except that the pilot could not close the cap on either droptank. He informed the plane captain of this and the plane captain closed the tank caps.

Both droptanks checked good when pressurized after start; however, the cap on the right droptank came loose on the catapult shot and fuel gushed out of the tank. At this time the tower advised the pilot he had a blown tire. The pilot knew he had lost some fuel and believed that the tower had mistaken this fuel for tire smoke. He continued his climbout and informed the lead of his probable inability to transfer fuel. He completed the rendezvous and they continued the flight with the intention of burning down before dropping any ordnance.

After 35 minutes of flight it became evident that the right droptank was not going to transfer. The pilot, considering fuel available, time to scheduled recovery and the use to which ordnance could be put, decided to land during the recovery which was then in progress rather than wait for his scheduled recovery which was an hour away. He turned back toward the ship, jettisoned the right droptank and advised the ship he was estimating the break in three minutes. Then, realizing that he was the last aircraft to be recovered, he requested a downwind entry in order to expedite.

The downwind pattern and the 180-degree position were less than correct. Coming off the 180, the pilot was still dumping fuel and his aircraft was low. The pilot corrected for the low and was then reminded that he was dumping fuel. He secured the dump switch, checked the fuel gage and reduced power in order to stop the ball in the center. At this time the tower advised the pilot to drop his hook, which he did. The pilot became so rushed with these tasks that he failed to recognize that he was not carrying enough power until after an excessive sink rate had been established. Before he could correct for the sink rate, the LSO initiated the waveoff lights and called for power. The pilot added 100 percent power and commenced a waveoff. As he crossed the ramp, the left wing dropped and the tailhook contacted the port cut and waveoff lights on the ship's Fresnel lens. The aircraft was then diverted to the beach where an uneventful field arrested landing was made.

The Commanding Officer made the following comments concerning this incident:

"This is a typical case of how a series of distractions can lead to a situation where the pilot is behind the aircraft, which in turn can easily lead to an accident.

"The pilot was rushing to make the end of the recovery one hour prior to his scheduled recovery. He was the last aircraft to be recovered and he knew he was delaying the ship. In a period of one and one-half minutes, he was:

- Making his first modified downwind entry to the ship.
- Dumping fuel all the way in his approach in order to get down to maximum landing weight.
- Readjusting his rate of descent after flying off a low start.
- Dropping his hook after being reminded to do so.

"This was too much for a pilot of his limited experience to handle and could have been fatal.

"It has been reemphasized to all pilots that there often comes a time when it is mandatory to stop a sequence of events and take stock of the situation before becoming a passenger vice the pilot of the aircraft. Obviously, in this case, the pilot could have stopped the sequence of events by taking an early waveoff and getting organized for a second approach."

Asking for Trouble

A T-1A pilot filed a flight plan for a cross-country flight, estimating 1 plus 57 enroute. The altitude requested was FL 240 and average winds were predicted to be 50 knots on the nose. When the pilot presented his flight plan, the Operations Officer refused to sign it because of inadequate fuel reserves. The pilot changed the time enroute to 1 plus 50 and resubmitted the flight plan. The Operations Officer then accepted the flight plan but not before he briefed the pilot on a recent accident which was caused by another pilot who tried unsuccessfully to stretch the range of his aircraft. The pilot listened to the story but assured the Operations Officer that he had many hours in this type aircraft and that he would refile in the air if it looked like he was going to run short of fuel. The pilot then departed.

To make a long story short, the aircraft flamed out five miles short of the destination airport at 3000 feet because of fuel exhaustion. At this time the pilot was very near a civilian airport and he decided to make a flameout approach to that field. He touched down 500 feet down the 4000-foot runway at 170 knots, *heading downwind*. He commenced heavy braking and blew both tires. He then ran off the end of the runway and travelled 360 feet before coming to a stop in soft mud. Miraculously, the damage consisted only of the blown tires and damaged main wheels.

The investigation of this incident indicates that "get-home-itis" was involved. That may be – but the primary cause factor in this fiasco was a gross lack of judgment on the part of the pilot. Aircraft *will not run on fumes* and any pilot whose preflight plan depends on reserve fuel for normal termination of the

flight *has no reserve fuel* and is just asking for trouble.

Hot Brakes

AN A-4C pilot aborted his takeoff roll because of insufficient engine RPM. This was fine but the pilot then decided to perform another takeoff roll (with no intention to become airborne) in order to properly check and record all engine instrument readings. The second abort went all right but as the aircraft turned off the runway the port tire and brake assembly exploded and caught fire. The fire was extinguished quickly by the NAS crash crew.

This incident was caused by the pilot's failure to recognize that the brakes had become overheated during the first abort and had not allowed sufficient time for cooling. Ordinarily, this would not require much comment but, unfortunately, he is not the only pilot to overlook this requirement. In another very similar case recently, an EA-6A pilot aborted his takeoff run when it appeared that the airspeed indicator was inoperative. During the initial stages of the abort, the airspeed indicator came off the peg; however the pilot elected to complete the abort.

After a long taxi back to the approach end of the runway, the pilot decided to attempt another takeoff since it now appeared that the airspeed indicator was working.

On the second takeoff attempt, at an estimated 80 knots, the altimeter quickly unwound 200 feet from the field elevation and the pilot again initiated abort procedures. Tower personnel, seeing the starboard brake smoking and sparking, mistakenly broadcast, "A-6 on takeoff roll, your aircraft is on fire." The pilot then increased braking pressure thereby blowing the starboard tire. Directional control was regained by the use of nosewheel steering.

The Commanding Officer's endorsement stated:

"... the pilot's decision to attempt another takeoff immediately after the first abort reflects a serious lack of understanding of the dangers involved in such an act. Questioning of the pilot revealed he had given no thought to allowing for brake cooling prior to gear retraction. If the takeoff attempt had succeeded, this could have resulted in a brake explosion in the wheelwell and possible loss of the aircraft."

Overheated brakes are a hazard to aircrews but they are a special hazard to ground personnel. Know the limitations on the use of brakes on your aircraft and observe all precautions for cooling brakes, including the use of specially designated areas.

(The duty runway is not the place to troubleshoot aircraft discrepancies, particularly in the first instance. A high-power turnup with the A-4C properly tied down is the accepted procedure. – Ed.)

HOME FIRES:

In this bedroom two children died after setting their bed on fire as mother slept.

DURING the past four fiscal years, 1389 fires resulting in 17 deaths, 207 injuries and $977,388 in losses occurred in Navy housing. From FY 57 through 70 there were 3722 fires which caused 38 deaths, 477 injuries and $2,578,733 in losses. Statistics are not available for fires in privately owned dwellings occupied by Navy families, but it is expected that there were similar losses in that category as well. These figures obviously indicate that naval personnel, wherever they reside, need reeducation in both fire prevention and what to do and not to do in the event a fire is detected in the home. For your family's and your own sake, read this article thoroughly and remember what you have read. It hopefully will help you to prevent a fire in your home. If one does occur, you should be prepared to take proper action to save lives and possibly restrict the fire damage to an absolute minimum.

At first opportunity take a good look at the interior of your home. It's loaded with such potential fire hazards as cooking equipment, electrical appliances, wiring, combustibles, fireplaces, power tools, matches, lighters and, in most homes, the number one fire killer, *smoking materials.* This year in the United States more than 6000 human beings can expect to lose their lives as a result of fires in the home, *a figure which equals our combined losses in the Revolutionary War and the War of 1812.* Unfortunately, the great majority of these fires and losses of life could have been prevented had the families involved practiced fire prevention and EDITH (Exit Drills In The Home). Fire prevention and EDITH will be discussed more fully later in this article, but first

FAMILY KILLER!

(From time to time, material is presented in APPROACH which, while not directly related to aviation safety, is nevertheless of great importance. The following article on the prevention of tragic household fires is considered to be an example of this type material. – Ed.)

This stair leads to bedrooms where father and son lost their lives.

let's briefly describe some of the fires which occurred in Navy housing during the 67-70 period:

• While playing in the service room adjoining the kitchen, a 15 month-old overturned a gasoline can, the contents of which were ignited by the flame in the burner of the hot water heater. This caused a flash fire which engulfed the baby and caused his death. His mother had gone next door to visit a neighbor and had left him in the care of his seven and five year-old sisters.

• A two-story home fire was caused by a short-circuit in the switch or cord of a lamp standing next to a sofa in the living room. The mother and son escaped down the open stairway and out the front door which was left open in their haste to leave. The inrush of air intensified the fire and it spread rapidly making the stairway unusable. The daughter was awakened by the family dog and she escaped via an upstairs window and adjoining porch roof. The father fell over a low table in his bedroom and, incapacitated by the fall, was unable to escape. His death was due to asphyxiation.

• A seven year-old girl was left unattended in her home. She was discovered with her clothing ablaze by a neighbor. The flames were extinguished but the child succumbed from second and third degree burns over 70 percent of her body. She had been playing with matches.

• When fire was detected the father ordered the mother out of the house and he proceeded upstairs to rescue the baby. Fireman found the bodies of the father and baby inside the entrance to the front door when they were able to enter the home. The fire was caused by smoking materials.

• When departing their housing unit the occupants neglected to turn off the burner under a pan of cooking oil on the stove in the kitchen. The grease ignited and the flames quickly spread to the walls, woodwork, ceiling, kitchen furniture and drapes in the living room. Damage to government property was estimated at $4000. There was considerable damage to the tenants' personal property as well.

The fires just described are but a few of the many which have occurred during the past four years, but they are representative of the most common ways by which

Smoking in bed cost the occupant her life.

Even though a watched pot never boils you had better watch it if it contains grease.

It started on the first floor but went upstairs to the second.

fire can be started.

It is imperative to note that the most serious Navy home fires occurred between 0001 and 0659. During this time frame only 12 percent of the fires were started, but they accounted for 27.4 percent of the fire damage. The average cost of each fire was nearly three times that of a fire occurring at any other time of day. This proves that when you are asleep, which most people are during these hours, your chances of detecting fire and smoke are extremely limited. Of all the statistics we might present, the one which is most startling is that concerning human element failure. People caused 75.9 percent of the fires and 63 percent of the fire damage through plain old carelessness.

The first and most important thing to remember about fire is the immediate danger of smoke. Most people who die in house fires do so because of asphyxiation. Therefore, if you detect smoke in the house, get everyone outside; once this is accomplished *then* call the fire department. Do this even if you think you can extinguish the fire without assistance. During the period FY 67 through 70 nearly half of the fires in Navy housing were extinguished by the occupants prior to the fire department's arrival. This is fine! However most of these fires were *small* and were detected during *daylight* hours. Even so, a number of these amateur firefighters received burns serious enough to require the services of a doctor.

Fire Prevention

How do we go about the business of practicing home fire prevention? Obviously it would be impossible to cover every contingency concerning home fires but by observing the following safety precautions we'll be traveling down the right road.

- Whether or not you or your family smoke, have ashtrays located wherever they might be needed by someone who does. Make sure they are large, made of a non-combustible material such as glass or metal and are shaped to prevent a cigarette from rolling off the edge.
- Never smoke in bed or when drowsy. *This warning cannot be over-stressed.*
- Check upholstered furniture closely, particularly after a party and before retiring. Hot ashes from smokes can smolder slowly deep inside the stuffing and give off deadly toxic gases. Make sure that ashtray contents are completely extinguished before placing them in trashcans.
- Don't leave matches out in the open. They are a delight (and often a disaster) for small children. Impress on youngsters that fire is *hot* and matches and lighters are not toys. Make sure the toys children play with are fire retardent. Every year several children are burned seriously or fatally because of toys which burst into

flames when ignited.

• Allow adequate space behind TV sets for ventilation. Never place them close to furniture, drapes and radiators.

• Keep an eye on the electric cords and attached plugs you're using. Do not place cords under rugs, through doorways or near radiators. When a cord or plug shows signs of wear or damage *replace it – don't mend it.*

• During the past four years the largest single cause of fires in Navy housing (36.7 percent) was involved with cooking, mainly by persons leaving unattended pans containing grease on stoves. If you must leave the kitchen while a pan of cooking oil or grease is being heated, for heaven's sake, turn off the burner.

• When it is necessary for you to work with flammable or combustible materials ensure that the work area is well ventilated and free of ignition sources. Do not smoke around combustibles and flammables. Never use gasoline or lighter fluid as a cleaner and under no circumstances bring gasoline into the house.

• Have your heating system checked yearly by a qualified serviceman and, when necessary, have it cleaned. Know what to do in the event of trouble and the location of emergency and fuel shutoffs. Keep the phone number of your repair service handy. Portable oil heaters have been outlawed in Navy housing and are not recommended for use in private housing. However, if some of you must use them, check them frequently. They should never be located in an area which could be used as a fire escape. Always insure that they are positioned level and on firm footing.

• Are you polluting your home with rubbish? If so, accomplish the following:

(1) Get rid of outgrown clothing, old mattresses, half-worn tires, rugs, chairs and the like which you won't use again. These are fire hazards and can help a fire to quickly spread.

(2) Keep everyday rubbish under control by emptying wastepaper baskets into covered trashcans which are located away from furnaces and stairs. Put all the trash out on pickup days.

We have tried to cover all of the main areas of fire prevention. If you pay attention to the safety precautions which have been presented, chances are you won't have a home fire.

EDITH (Exit Drills In The Home)

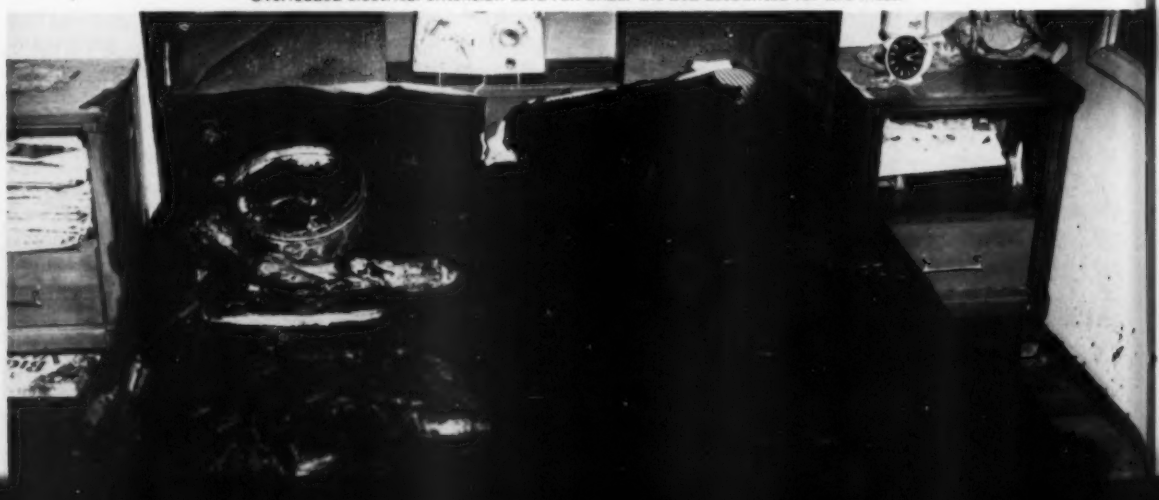
The program EDITH, initiated by the Fire Marshals Association of North America, was heartily endorsed by the International Association of Fire Chiefs in conference assembled on 25 August 1966 recommending that full support and cooperation be pledged to the Fire Marshal's Association in their efforts to combat the tragic loss of lives in home fires.

EDITH is a program designed primarily for family participation; it is to help the family help themselves in the event of fire or other hazardous situations. EDITH won't work alone; it requires careful planning and drilling. It could well be the method for saving the lives of all members of your family.

Get all members of the family together and discuss with them the possibility of a fire in the home. Go over escape routes to the outside from each room, particularly bedrooms. Select a location outside for an assembly point for all members of the family. Each should remain in this spot until all are accounted for. Alternate routes must be provided. You must plan to get out of the upstairs bedrooms, possibly without using the stairways because rising heat and smoke usually eliminate that means of exit. Make sure that all members of the family know how to call the fire department, the location of the nearest fire alarm box and the telephone number of the local fire department. Insist, however, that the first and most important thing is to get out of the house should a fire start.

If windows open onto a low roof over a porch or extension you are in luck. From there you can easily drop to the ground. Some people even keep a ladder on

Overloaded electrical extension cord run under the bed accounted for this mess.



- Careless use and disposal of smoking materials accounted for 12 percent of the fires, 19.5 percent of the losses, 18.8 percent of the injuries and 58.8 percent of the deaths.
- Careless use of matches and lighters (usually by children) accounted for 14 percent of the fires, 17.5 percent of the losses, 11 percent of the injuries and 17.6 percent of the deaths.
- Careless cooking habits caused 36.7 percent of the fires, 16.4 percent of the losses, 38.2 percent of the injuries and no deaths.
- In other words matches and lighters, smoking materials and careless cooking habits combined accounted for 62.7 percent of the fires, 53.4 percent of the losses, 68 percent of the injuries and a whopping 76.4 percent of the deaths.

Paper towels stored too close to gas fired hot water heater started this fire.

the low roof for such purposes.

If a fire occurs and you are forced to drop from an upper bedroom window, throw down a mattress to soften your fall, if at all possible. Then slide out the window backwards on your stomach, hang briefly from the window sill, flex your legs slightly and let go. By hanging from the window sill you are already about one-third of the way to the ground. Don't jump unless all other escape routes are cut off and the heat is unbearable.

Be sure your plan is workable and practice it from time to time with all members of the household cooperating. New furniture arrangements may block an exit. A window may be impossible to open, too small to use or too high to reach. A screen may be held fast by paint encrusted hooks which no child could possibly unlatch. You should also hold drills at night with all the lights out. Can the alternate routes be followed, are they blocked, do the children stumble or fall?

In your planning you will have drawn a floor plan of your home showing the main and alternate routes and selected an assembly point where all members of the family should report and remain until all are accounted for.

If at all possible sleep with the bedroom doors closed. Even a thin door can prevent fire and toxic gases from reaching you. In the event of a suspected fire don't open the door without first feeling it with the palm of your hand. If it's hot, take an alternate route from the room. If the door is not hot, brace yourself against it with your foot and open it slightly with your face away from the crack. If smoke or heated gases puff through or there's pressure from the other side; close the door quickly. You can't go out that way. Superheated air will kill almost instantly and smoke is frequently lethal.

Should you awaken in a smoke-filled room, cover your nose and mouth with a pillow case, bed clothing or anything available and crawl on the floor to the nearest window. The air closest to the floor is safest – but take short breaths.

If your escape is simply by walking out the front door, close it behind you – open doors and windows create drafts which feed fires. When making your plan you selected an assembly point. Wait there and don't permit anyone to reenter the burning building. All too often someone will be killed attempting to retrieve a favorite toy or pet or by trying to rescue another person who has already escaped.

Children are easily frightened in an emergency. They often crouch under beds or hide in closets when a fire breaks out thinking they will be safe there. You must make them understand the importance of the fire drill and see that they obey your instructions.

If you and the family remain calm when fire strikes, chances are you will survive. Always remember this: FIRST, GET EVERYONE OUT OF THE HOUSE. *THEN* CALL THE FIRE DEPARTMENT.

There you have it – a comprehensive look at the tragedy of home fires, how to prevent them and what to do if you are confronted with one. Only you can do something about it. It doesn't require an advanced degree – just good common sense. It's your responsibility. Take action today to prevent a fire or loss of life tomorrow. ◄

... and I quote.

'The child has been driving for some time!,' Grandfather of a seven year-old caught driving by a New York state trooper on a heavily traveled highway.

'A gamb machine two bucks ur dime can't get be efore th pops up,' o Safety definition o rking m

'I want to join the fire department and thought I'd practice driving to fires,' New York speeder who barreled past fire equipment enroute to a blaze when stopped by a trooper.

'If you don't like police, next time you need help call a hippie!,' Bumper sticker on Johnstown, Pa. car.

'If you look like your operator's permit photo, you aren't well enough to drive,' D.C. *Traffic Safety Reporter.*

gamb machine that bets
ucks ur dime that you
get be efore the red flag
p,' O o Safety League's
ion o rking meter.

Courtesy Virginia Traffic Safety News

Ice and Snow wherever you go

NORMAL DAILY AVERAGE TEMPERATURE - JANUARY

Fig. 1

THE MONTHS of January and February in ConUS are the worst flying months of the year and as can be seen in Figs. 1 and 2 there is little to choose between the two. Figure 3 shows considerable improvement in March and the worst is over in most places by April. Notice that the normal daily average temperature in January and February for more than half the country is below freezing. Note also as indicated by the 40-degree isoline the temperature will be below freezing before climbing to 3000 feet in all but about one-fourth of the country along the southern tier of states. (Dixie, suh!) Figure 4 portrays the average snowfall which dips way down south. Mix in precipitation with these temperatures and pilots can easily see the kind of workout with which they will be faced.

Other climatic conditions which add to the insidious nature of "ole man" winter are the strong winds, fast moving fronts and extreme chill factors frequently encountered. For those benighted souls who must work outside in these conditions, only one word – miserable – can describe the situation.

If ever proper rest, proper food and clothing means anything it is during these periods of short days and long nights. The simplest acts of outdoor work, which individuals perform without a second thought during the summer, become burdensome chores in the winter and require large expenditures of energy.

Undoubtedly flight surgeons assigned to squadrons, aviation ships and shore stations have already been hard at work giving cold weather lectures and showing films covering such things as general health, working conditions and survival techniques. Read, heed and comply with the advice and counsel of these pros.

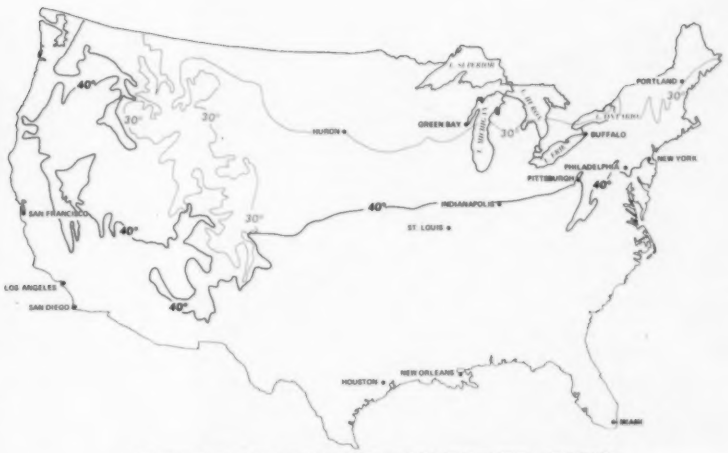
Pilots and flight crewmen should remember that most facets of flight ops are going to take more time during cold weather. Ground servicing will take longer, taxiing will be slower, intervals in the pattern will be wider – in fact, everything will take extra time. Plan for this and be pleasantly surprised at how smoothly operations *can* be conducted under adverse conditions if planned ahead of time. In order to be fully prepared for this winter it is suggested that pilots and crewmen review cold weather procedures for aircraft servicing; engine starts and stops; ice and snow removal before flight; deicing and anti-icing systems; aircraft, pitot and carburetor heat systems; landing, takeoff and taxi techniques.

The keys to ensure safe, routine operations are extra time, careful preparation and thorough knowledge of your bird and its systems.

* Data shown in this article is reproduced from *"Climatic Atlas of the U.S.,"* U.S. Department of Commerce, ESSA, Environmental Data Service, June 1968.

NORMAL DAILY AVERAGE TEMPERATURE - FEBRUARY

Fig. 2



NORMAL DAILY AVERAGE TEMPERATURE - MARCH

Fig. 3

MEAN ANNUAL TOTAL SNOWFALL INCHES

Fig. 4

ACM

TWO F-8J aircraft were recently involved in a mid-air collision during the course of practice ACM (air combat maneuvering). In this case, the hop was originally scheduled as an instrument check for one pilot in an F-8J who would be chased by an instructor pilot in another F-8J. The flight leader briefed that, following the instrument check, the flight would engage in practice ACM until fuel requirements dictated a return to the field. However, after manning the aircraft, it was discovered that one aircraft had an inoperative tacan. The flight leader therefore decided to devote the entire hop to ACM.

After takeoff the flight switched to squadron base frequency and proceeded toward an overwater warning area. When they were out over the water, the instructor pilot spotted two F-4s and suggested that they go after them (which they did) with the pilot under instruction in the lead. After a few turns with the *Phantoms*, the F-8s broke off and proceeded independently in preparation for some one-on-one ACM practice.

In setting up for the first engagement, the flight leader positioned himself aft and high on the port side of the other aircraft. He called rolling in and told the defending pilot to try to take the advantage away from him. After a short time the instructor pilot advised the defender that he was in the missile envelope and simulated a missile shot. They then broke it off and proceeded back up to FL 240. This time the instructor pilot put himself low, forward and to the port side of the pilot under instruction. The pilot under instruction rolled in on the defending aircraft and after an initial overshoot (which neutralized his advantage) began a descending defensive spiral which shortly developed into a rolling scissors maneuver.

After a few minutes, during which neither aircraft was able to close to within the missile envelope, the instructor pilot decided that he was not winning with these tactics, so he rolled wings level and pulled up in a nose-high maneuver, allowing his airspeed to rapidly bleed off to 150 knots. By so doing, he hoped to force the other aircraft out in front.

TRAINING ACCIDENTS

When the pilot under instruction saw what was happening, he also pulled the nose of his aircraft up and started a left turn into the instructor in order to keep from overrunning. In so doing, he set up a rapid rate of closure between the aircraft but was confident that he could pass over the top of the other aircraft. However, due to his rapidly decreasing airspeed and the continuing climb of the instructor pilot, he realized at the last second that he could not go over the other aircraft. He then pushed his stick forward in an attempt to go underneath. Meanwhile, the instructor pilot who had been holding his wings level and watching the other aircraft close on him, realized that a collision was imminent. In the last seconds before impact, the instructor pilot rolled away from the other aircraft in an unsuccessful last ditch attempt to avoid the collision.

As nearly as could be determined afterwards, the two planes hit with the upper half of the aircraft flown by the pilot under instruction striking the lower half of the instructor pilot's aircraft, somewhere aft of the cockpit. Neither pilot could remember afterwards whether the collision was fuselage to fuselage, wing to fuselage or wing to wing.

Immediately after the impact both pilots were surrounded by flames in the cockpit and they immediately ejected. Both ejections were successful and the pilots were rescued from the water by helicopter a short time later. The pilot under instruction was uninjured but the instructor pilot, who had been flying without gloves and with his sleeves rolled up, received burns on his hands and forearms.

One of Many ACM Accidents

This accident is only one of many ACM accidents which have been reported to the NAVSAFECEN in recent years. A statistical study of ACM accidents from 1963 to October 1970 shows that ACM has taken a toll of 65 aircraft and 33 aircrewmen. This is tragic enough but of even greater concern is the continued unabated *increase* in ACM accidents since 1967. In the first 10 months of calendar year 1970, for example, there were more ACM accidents than there were during 12 months of any previous year. Concern for this continuing increase in ACM accidents prompted the release of NAVSAFECEN Flight Safety Advisory 2-70 (NAVSAFECEN msg 310045Z Oct 1970). This Advisory provided detailed information on ACM statistics from 1963 to October 1970. The substance of this Advisory is considered to be of sufficient importance to merit reprinting here.

Continued

ACM statistics for the period 1963 to October 1970 are presented in the following charts:

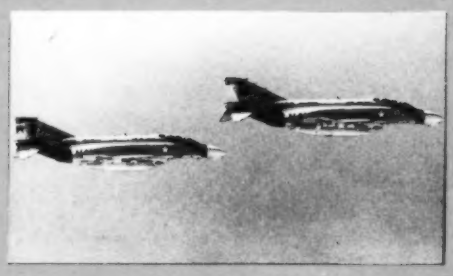
	Pilot Factor Accidents By Type Aircraft				Accidents Due to Material Failure	Accidents Due to Pilot Factor	Aircraft Destroyed	Fatalities
	F-8	F-4	A-7	A-4				
1963	0	0	-	1	1	1	2	1
1964	3	1	-	0	1	4	5	1
1965	0	1	-	2	0	3	3	1
1966	1	1	-	0	0	2	2	2
1967	0	7 (2)	0	4 (2)	0	11	12	5
1968	5 (1)	0	1 (1)	4 (1)	1	10	12	6
1969	1	4	4 (1)	2 (1)	3	11	13	8
1970	5 (2)	4	1	0	6	10	16	9
Totals	15	18	6	13	12	52	65	33

The figures in the above chart include only major accidents. They do not include minor mid-air collisions, or minor damage accidents due to overstress. The figures in parenthesis are major mid-air collisions.

(Note: In addition to the losses tabulated above, an A-7 and an F-4 were lost during ACM training in the early part of November 1970.)

The following tabulation is a breakdown of major ACM training accidents (including those caused by material failure) by major command involved:

	F-8	F-4	A-7	A-4
Lant	2	10	0	3
Pac	9	15	6	8
Reserves	2	1	0	2
Marines	2	0	-	0



Analysis of Accidents

An analysis of all accidents by model indicates some common cause factors. In addition, there are also community/model peculiarities. Some of these cause factors are as follows:

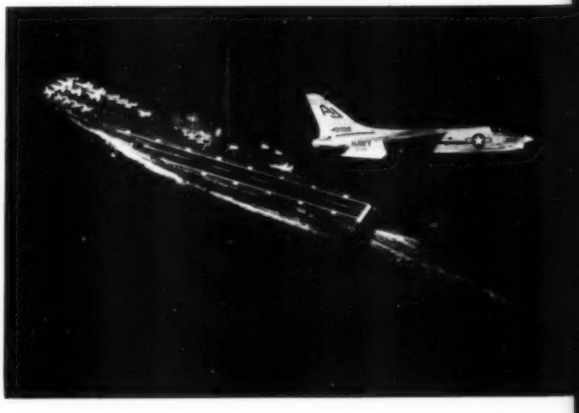
- *F-8:*

(1) The majority of F-8 accidents were stall/spin accidents by relatively experienced pilots.

(2) Nearly all accidents have occurred at speeds near or below 200 knots in a slow speed scissors.

(3) Material failure during ACM has not been a major cause factor.

(4) Average F-8 pilot experience in the 1970 accidents was over 900 hours in model and over seven years as a naval aviator.



• *F-4:*

(1) The F-4 accidents covered a wider variety of cause factors than other aircraft. Two involved fuel exhaustion with two additional suspected fuel exhaustion accidents. Two were stall/spin accidents while in 1/2 flaps configuration with the majority of other accidents involving either failure to recover from a dive or a clean stall/spin.

(2) In 1970 there were five material failures during ACM that resulted in the loss of two aircraft and substantial damage to three.

(3) Air discipline violations were less of a factor in F-4 accidents than they were in accidents involving other types.

(4) The average experience of F-4 pilots was four years as a naval aviator.

• *A-7:*

(1) Two mid-air collisions occurred in the A-7; one involved another A-7 and the other accident involved an A-4. The majority of all accidents were due to stall/spin at or below 10,000 feet.

(2) Two accidents occurred during unauthorized (unbriefed) ACM.

(3) Material failure was not a factor in any A-7 accident.

(4) Four of the seven pilots involved in A-7 accidents had been naval aviators for one year or less.

• *A-4:*

(1) All mid-air collisions in the A-4 were with dissimilar aircraft and with the A-4 in an offensive fighter role. Three of the four occurrences were unbriefed and are the classic case of two aircraft trying to occupy the same airspace at six o'clock.

(2) There were no accidents in the defensive phase of ACM.

(3) Only three accidents were attributed solely to pilot technique.

(4) The majority of pilots involved in ACM accidents had been designated naval aviators for less than one year.

Some Common Factors in ACM Accidents

Two common factors have existed in recent ACM accidents involving the same model aircraft as opponents:

• The flight leader failed to terminate the exercise when a stalemate had been reached.

• The flight leader failed to terminate the exercise when a significant advantage had been gained by one aircraft over the other.

The majority of F-4 and F-8 accidents, including mid-air collisions, occurred when the aircraft were being flown at low energy levels, where the aircraft have questionable tactical use.

There were three accidents where ACM was conducted without communications or with the aircraft involved not on a common frequency. One USAF GCI site was involved in two of these. Insufficient separation from an undercast trapped three pilots who were well on their way to a recovery from a wingover or reversal stall. Lack of a horizon or ground reference also figured in two additional stall/spin accidents.

Preventing ACM Accidents

ACM training is recognized as being potentially more hazardous than many other types of training; however, it is also recognized that there exists a bona fide requirement for such training. Therefore, the Naval Safety Center does not seek to discourage necessary combat training as a means of avoiding accidents. Rather, the potential hazards should be carefully considered and training should be accomplished under carefully controlled conditions with maximum supervision. If this is done, there is no reason why ACM training cannot be conducted both realistically and safely. Individual pilots must bear a large part of the

responsibility for the safe conduct of ACM training. Prior to engaging in ACM, individual pilots should insure that they are in compliance with all appropriate directives and should observe the following precautions as a minimum:

- Do not engage in ACM unless scheduled or otherwise authorized to do so by competent authority.
- Conduct ACM only in approved and designated areas.
- Do not engage in ACM unless you are assured that your flight as well as all others involved have been properly prebriefed.
- Maintain radio contact with all aircraft involved unless specifically briefed to the contrary.
- Be aware of minimum altitudes. Recognize that fleet air, air wing and squadron directives frequently specify more stringent altitude and cloud separation minimums than those set forth in General NATOPS.
- Be aware of your own limitations. Do not push yourself beyond the limitations which are dictated by your experience and training. You should also be aware of the capabilities of the other pilots involved insofar as possible.
- Use the whole team. If you fly with an RIO, enlist his assistance. An extra pair of eyes are invaluable.
- Know the stall/spin characteristics of your aircraft and know proper recovery procedures. Think these matters out beforehand. Keep your aircraft limitations in mind and be guided by existing flight parameters such as altitude, speed and power before deciding to undertake a maneuver.
- Finally, be alert, use your good sense. Recognize it as a training situation and stop short of pushing your aircraft or yourself to the point where safe recovery is doubtful or impossible.

Many other specific recommendations could be developed but the overall requirement is for good headwork and rigid adherence to existing procedures. In addition, there is a particular requirement for professional flight leader judgment and supervision. Only through such performance can the unnecessary toll of pilots and combat aircraft be reduced. ◄

FLIP Changes

THE Department of Air Force, Headquarters Aeronautical Chart and Information Center, St. Louis, Missouri has notified the Naval Safety Center of the following changes to FLIP documents:

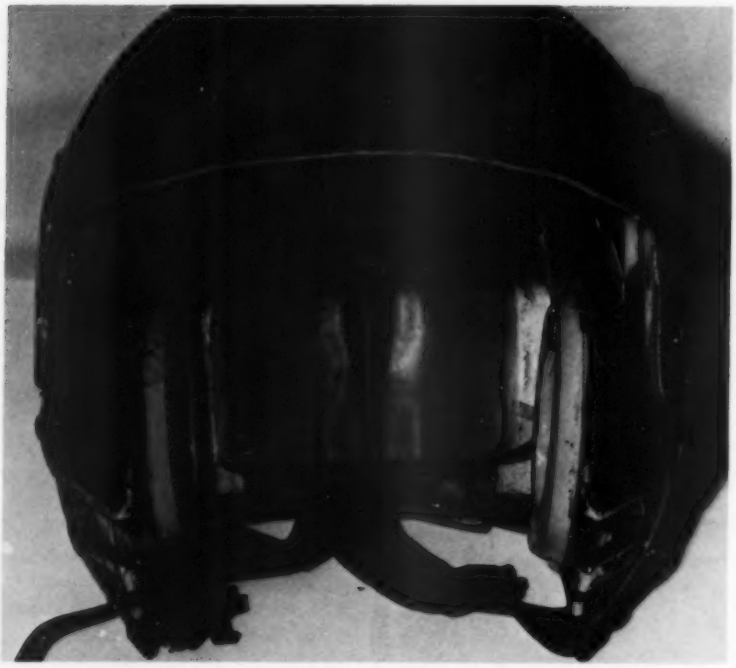
- *VIP Remarks:* The pickup and dropoff points for VIP passengers should be listed in the Remarks Section of the DD-175. See FLIP Planning Section II, North and South America.
- *FLIP Terminal:* As an aid in identifying current volumes, the expiration date will be printed on the backbone of all FLIP Terminal volumes. This practice will begin with the December issue of the U. S. Low Altitude Terminal booklets and be subsequently extended to other FLIP Terminal products, on a world-wide basis, as production schedules permit.
- *VFR Products:* Beginning with the current issues, the VFR Supplement and the Aerodrome Sketches for the United States will both be produced every six months. Periodic updating will be accomplished through MANs (Military Aviation Notices).

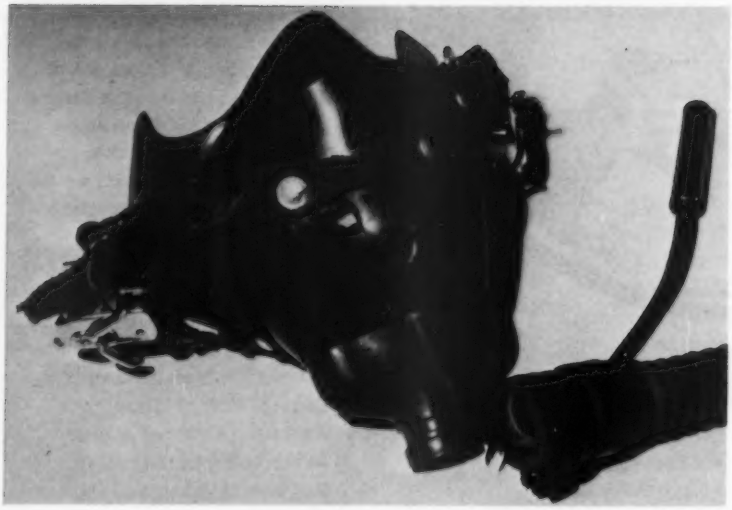
HIAWATHA

gets his lumps!

By LT Norman E. Lane, MSC, USN

On the giant steel-gray carrier,
On the great and mighty bird farm,
Dwelt the flyer Hiawatha,
Brave and noble Hiawatha.
Veteran he of many landings,
Night and day in every weather.
All who knew him praised his prowess,
Sang about his reputation
As a wizard of the ether.
In his steely, blue-eyed visage,
Many saw the look of heroes.
" 'Tis John Wayne," the people murmured.
Nay, oh, nay, 'tis Hiawatha,
Slayer of the strong in battle,
Conqueror of the tempest's terrors.
He is clearly not as others,
Common men no competition
Offer to our Hiawatha.
But at last our noble warrior
Fell into the trap of others,
Such as mighty Alexander.
Saw himself as more than mortal,
Took publicity for gospel,
And his deity for granted.
He prepared to fly one evening,
In the lowering shades of twilight.
"Care and caution," said our hero,
"Are for common, timorous cowards.
Not for me, this waste of effort,
I could fly without an engine,
Held up by the gods' good graces."
Thus he kicked the tires and climbed in.
Strapping on his winged charger,
He launched out into the darkness.
Manitou, the God of godlings,
Cast his gaze on Hiawatha.
"Who is this," the Great One thundered,
"Bragging of divine protection?"
Manitou, his anger risen,
Turned his wrath on Hiawatha,
Blew his frosty breath upon him,
Made the heat go from his turbines,
Turbines which had not been perfect,
But had not been checked beforehand,
Ends the Tale of Hiawatha,
Ends upon a note of sadness,
At the falling of the mighty.
Men who fly up toward the heavens,
Toward the palace of the Sky Gods,
Should recall our Hiawatha,
Just as Icarus before him,
Victim of his own ambition.
None who fly are so immortal
That they cannot feel the backlash
Of a failure to take caution.
For complacency can conquer
Strong and weak without exception,
And the end of other heroes
Could be that of Hiawatha.





WHEN A TA-4F took a hit from an exploding round on the upper right of the armored windscreen, this oxygen mask and helmet saved the pilot's day. Fragments penetrated the windscreen and blew out the right forward section of the canopy. The round also went through the windscreen bow and the canopy bow. The pilot had his clear visor down and his mask good and tight. One fragment broke his microphone into several pieces and penetrated his oxygen mask. Other fragments broke his helmet visor and cut the right collar lobe of his LPA-1. *His only injury was a bruised right eye and he was back on flight status within 48 hours.* "My visor and mask," he says, "saved the day!"

H&MS-11, MAG-11

"Don't Panic . . . Relax!"

YOU never know when something you do or say may have a profound influence on someone else's life. Somewhere there's a survival swimming instructor (or perhaps, by now, he's a former survival swimming instructor) whose voice echoing in the mind of one of his trainees in a submerged helicopter in total darkness saved him from drowning.

"All I could think of while under water were the chief's words during training – *Don't panic! Relax! . . . Relax!*" the first crewman reported after rescue. "This, I believe, saved my life."

After takeoff, the helicopter collided with the water, then became airborne again. The first crewman made a visual check of the aft cabin, reported to the pilots that everything was secure, then strapped in again. The helicopter contacted the water a second time and rolled inverted.

"After the crash," the first crewman states, "I first had the feeling of dreaming about swimming, then I realized that I was actually under water. I tried to move and found my seat belt still attached and my left arm and left leg pinned. I released my seat belt and moved it out of the way with my right hand, then freed my left arm and left leg. I felt around for something to orient myself within the aircraft and felt with my left hand what I believe to have been the upper litter support rod. I then turned to my right and pulled myself out of the aircraft. Once out, I reached out with my arms and legs to ensure I was clear, then inflated the left side of my mae west to find out which way was up. With a direction, I swam to the surface.

"During the entire period of time I was under water, I was in

notes from your flight surgeon

total darkness. Everything was accomplished by feel. *I strongly believe that I would have remained in the aircraft had it not been for the survival swimming training that I received."*

"Don't panic – relax!" cannot be overemphasized in swim training states the reporting flight surgeon. The instructor must say it often and in many ways to make sure that his students will hear those words when they are faced with an actual survival situation similar to that described above. Dilbert Dunker training is invaluable in driving the point home.

Corroded and Jammed

"CORRODED and jammed" was the condition of the cylinder of a pilot's .38 revolver on inspection after he was picked up from the water after ditching near the ship at night. The .38 had three tracer rounds in it and was so fouled that it would not have worked if he had tried to use it.

You *must* keep your survival equipment in top operating condition if it is to serve you in an emergency. When was the last time you inspected your equipment?

Flight Clothing Discipline

BOTH pilots involved in a midair during ACM (air combat maneuvering) ejected from flaming cockpits after their aircraft collided and exploded. The only injury was to the pilot who had his sleeves rolled up and was not wearing gloves. He suffered first and second degree burns of the forearms and left hand. The second pilot, wearing nomex gloves and flight suit sleeves rolled down, was uninjured.

"Burn injuries to one pilot and none to the other as a result of ejecting through fireballs," the final endorser writes, "again reinforces the importance of proper flight clothing discipline."

All the Ingredients

A FLIGHT deck crewman a little bit late getting out of the sack, hurrying to his job by an unaccustomed route, leaning into the wind with his hands up to his face, and an E-1B aircraft parked next to the island with its engines idling after turning up for the 0645 launch . . . all the ingredients for a prop injury and it happened.

The crewman is amnesic for the time between going up on the flight deck and coming to in sick bay. The starboard prop cut his face, amputated his right index and middle fingers and cut tendons in his right hand. He doesn't remember if his chin strap was fastened but before his helmet flew off his head it absorbed most of the impact from the prop blade. This saved his life.

The investigating flight surgeon has some words of wisdom:

- Be fully awake before going on the flight deck.
- Check the situation when you first arrive. Are propellers turning? If so, where are they? Plan to avoid that vicinity.
- Never rush. Better be late and chewed out than be on time and chewed up.
- Heads up when walking into the wind.
- Never walk through a propeller arc *whether the prop is turning or not.* This practice helps establish a habit pattern of propeller avoidance. And be *extra* alert when wearing a sound-attenuating helmet around aircraft.

"No, son, this is a destroyer . . . Now the ship you want is about two miles . . ."

Out Of The Past

Occasionally the Editor receives stories from naval aviators concerning incidents of the long ago. If the article has real time application it is published regardless of when it happened. This story definitely qualifies.

A Most Regrettable Decision

By LCDR C. Thomas Steckler

IT WAS early March 1962 when I had the most anxiety-filled flight of my career. I shall never forget that flight and I shall never forget the chain of events which caused it.

I was a member of a utility helicopter detachment on board USS Lake Champlain. The detachment consisted of two officers, seven enlisted men and one venerable HUP-2. Our vintage machine (circa 1953) was powered by a Patton tank engine. The tandem rotor configuration made it ideally suited for utility work and plane guard duties but it was grossly underpowered, extremely shortranged and was not equipped for instrument flight. We did have a compass and one UHF radio. The HUP was truly one of the Navy's last seat-of-the-pants aircraft.

Our detachment's mission was typical of that which utility helicopter detachments perform today, i.e. plane guard, mail runs, personnel transfers, cargo runs and taking the chaplain or doctor to the destroyers or submarines operating with us. In the utility helicopter business there was never a dull moment. The flight which caused such personal concern involved more sweat than I had encountered previously in 1000 hours of flying.

We were conducting coordinated ASWEX with our task unit and I had just landed after a brief plane guard flight. The Air Boss called on the radio: "Angel, go out 230, 30 miles and pick up two passengers from a submarine. What is your fuel state and do you desire more fuel?" I had aboard 325 pounds which was sufficient for an hour and forty minutes. The bearing of 230 would be a downwind leg and the wind was about 15 knots. Quickly calculating the time to get to the submarine (25 minutes), the time to hover and pick up the passengers (10 minutes) and the headwind back to the ship, which would be closing the submarine while I was gone, (another 25 minutes) I allotted one hour for the flight. This gave me 40 minutes reserve; so, I replied, "Negative fuel required." Anyway, if I filled up that would just be added weight which might restrict me from being able to take on two passengers. This hop would be routine all the way. Little did I realize how I would regret not taking some extra fuel. Up, up and away we went. After about 15 minutes it occurred to me that the sea had considerably more white caps than when I started out. However, no sweat. I'd just get to the sub quicker. The increase in white caps would make the submarine more difficult to spot so I brought my crewman up front to help as a lookout. *(The normal configuration for plane guard work and personnel transfers in the single-pilot HUP was to remove the right seat and place the crewman behind the pilot. – Ed.)* The bearing of the sub from the ship was accurate but as it turned out the distance was a good 30 miles.

The submarine was not ready to make the transfers when I arrived so I wasted about five minutes in orbit overhead. The sub turned into the wind and the two passengers prepared for hoisting. My crewman was well qualified and quickly hoisted them aboard but again we had a slight delay in returning our passengers' lifejackets to the sub. I departed on heading 050 with the passengers settled into the troop seats and cigarettes were passed around for a smoke as we relaxed to enjoy the return to the birdfarm. After about 15 minutes I began to scan the horizon for some sign of the carrier's mast, wake or smoke. Nothing. After another 10 minutes there was still no sign of our home-away-from-home. About this time an H-34 helicopter joined on my port side and the pilot checked in on the radio to advise he was my escort. He had been vectored by the carrier to join up. I asked if he had a fix

on the carrier and he replied, "Affirmative, 23 miles dead ahead." TWENTY-THREE miles! I couldn't believe it. I had been inbound for 25 minutes and that meant another 25 minutes to go. The catch was that I only had 30 minutes fuel left. Suddenly the routine flight had an additional factor – large size pucker – to be considered. Now it was a race to get the helo and its occupants safely aboard. If I didn't make it at least I wanted to get as close as possible. Several thoughts flashed through my mind. I thought of a controlled ditching, but only momentarily as I relived one successful ditching I had made after an engine failure. I thought about unloading the passengers to lighten the load and reduce fuel consumption. After all, the other helicopter could pick them up, but I did not like that idea for many reasons. So I continued grinding along, told my crewman to brief the passengers and prayed the carrier would soon appear. I thought about the irony of the situation that this actually was happening to me. I had been flying identical missions for two and a half years. These bizarre events always happened to the other guy. I had considered all aspects of this mission carefully. My experience would not allow this to happen. But it was happening and I was experiencing a feeling of helplessness which was entirely new to me. I thought, "Where is that ship?"

My escort advised that our ground speed was 60 knots. That was considerably less than it should have been. We were indicating 86 knots. Something else was occurring that was not apparent at the time. It was quite obvious what it was when the ship finally came into view. *It was steaming away from us* – not closing as I had been advised – and if it kept on running away I wouldn't catch it. At the rate of fuel consumption and with the remaining distance it looked as if I might reach the ship about the same time the fuel supply was exhausted. I could not risk an engine failure at the same time I was landing. I didn't like the idea of my rotor blades clawing away on the side of the ship because we *almost* made it. I spelled out our predicament to the Air Boss in a normal voice (two octaves higher). Funny how the word emergency galvanizes people into action. It took no more than five minutes for the C.O. who was "unrepping" with an oiler to break away and turn toward me. Now I realized why the carrier had not been closing the submarine. An oiler, a broken chain of communications, bum word, a few minutes extra delays, not taking on some more fuel had caused this fiasco.

I made it! The landing was the most welcomed of the thousands I've made aboard ship. The fuel gage had stopped recording five minutes before I landed. There was no way to determine the amount of fuel remaining in the tank but I know I never want to get that low again. Later, after I had written the account of the mission, everyone agreed with me. It was a needless predicament – one that could have been avoided easily.

Need we say more about runways behind you, altitude above you, fuel in somebody else's tank, etc., etc?

self-medi

JANUARY . . . February . . . March . . . these are the months which are very often the peak of the head-cold and flu season. In the mobile, all-weather world of naval aviation it's sometimes mighty hard to go through a whole winter (or even through a summer) without what our flight surgeons call a "URI" or upper respiratory infection. If you eat right, get plenty of sleep and think kind thoughts, somebody can still sneeze on you in the ready room and two, three days later, there you are, reaching for the kleenex and checking through your medicines for something to relieve your miseries.

Don't do it!

Don't do what?

Don't, as they say, self-medicate.

Sometimes you can get by with it – take your powerful handy-dandy-over-the-counter cold capsules, go flying, land safely and say, "See? What's everybody jawing about? No sweat." But sometimes maybe you won't get by with it. And it doesn't take but one time to put a dent in a promising career.

Self-medication may very well have been the reason why a pilot under instruction in an OV-10A failed to eject several months ago.

Student and instructor were apparently attempting a simulated single-engine high key approach pattern, investigators said. Altitudes were lower than shown in NATOPS and the aircraft was 800 to 1100 feet low at low key. The accident, in the investigation board's opinion, seemed to have resulted from a stalled condition, probably induced by the student as he retracted flaps while in a turn. The instructor ejected at an altitude outside the prescribed safe envelope for ejection. The student was thrown clear of the wreckage as the aircraft hit a sand dune on final impact and broke up. Neither man survived.

Information turned up in the investigation indicated that the student was not up to par for the early morning flight. The night before he had had only 4 hours and 45 minutes of sleep. (He was described as a person who needed at least eight hours of sleep to function properly.) He had gone to bed at 2300 and, about 15 minutes later, had started blowing his nose. Shortly after that, he had a severe coughing spell with a hard, productive cough. He got up, went to a drug store and bought a patent cough medicine. When he got back home he drank 70 cc., *four-and-a-half times the recommended adult dose*. This relieved his cough and wheezing and at 0100 he went back to bed and went to sleep. The next morning he appeared alert and normal.

Although a person can appear normal after such medication, decision-making abilities and reflexes can definitely be slowed. A component of this particular

cough medicine is a codeine derivative called dextromethorphan. According to the *FAA Guide to Drug Hazards in Aviation Medicine,* "airmen duties are contraindicated for 12 hours after use" in normal dose. An undesirable effect in aviation is moderate depression (of reaction time) from large therapeutic doses.

"The fact that the student was normally slow to react, had an inadequate amount of sleep and took four-and-a-half times the recommended dose of the cough medicine eight hours previously, probably contributed to his not ejecting," the investigating flight surgeon reported. "After having taken so much cough medicine and with inadequate sleep, he should have had the presence of mind not to fly. We should continue to emphasize to pilots *no self-medication especially prior to flying.*"

The accident investigation board was in agreement that the student pilot's condition was a contributory cause factor. He had previously experienced difficulty in familiarization and transition flights, particularly in the area of visual approaches. The board felt that because of his self-medication and lack of sleep, the student was not at his best physical condition for a type of flight he found most difficult. The board concluded that "it is highly likely this normally slow pilot's reaction time was adversely affected by medication and lack of sleep."

"It must again be stressed that aircrews *must not* practice self-medication," the board said. "The wide variety of undesired effects which may result from usage of readily available on-the-shelf medication is staggering. These effects may be the critical items which determine success or failure while under stress in flight."

Prescriptionless over-the-counter medicines are of great concern to those responsible for aviation safety as is the dangerous practice of taking old prescriptions for new illnesses. Your flight surgeon is the man to answer your questions on specific products. In the meantime, here is a brief rundown on the hazardous effects of some drugs where flying is concerned. It is based principally on the FAA drug guide which we mentioned earlier in this article. Time limits which should elapse between taking a drug and flying are conservative. The times given are those at which undesirable effects would be presumed to be absent *even in sensitive or reactive persons.*

Antihistamines – Some people can take antihistamines and it doesn't bother them. Other people have all kinds of reactions – drowsiness, dizziness, dry mouth, headache, nausea, muscular twitching and, in rare cases, high temperature. (One particular antihistamine causes excitement instead of drowsiness.) Drug-induced drowsiness can be especially dangerous because you may not recognize it – it can come and go after periods of apparent alertness. Antihistamines can also affect your depth perception, the operation of your inner ear and your perceptual-motor skills. The FAA drug guide advises that airmen do not fly for 24 hours after taking the usual dose or for 12 hours after one-half the smallest adult dose listed in the two publications, *Pharmacopeia of the United States of America* and *New*

and Nonofficial Drugs.

Sulfa drugs and antibiotics – Some sulfa drugs can cause nausea, vomiting and dizziness. Effects which can show up later are dermatitis, rash, hepatitis, and a disease called agranulocytosis. As with sulfa drugs, usually any pilot or crewman taking an antibiotic is under his flight surgeon's supervision. However, it doesn't stretch the imagination a great deal to picture someone, who for one reason or another doesn't make it to sick call, taking a drug prescribed by a civilian physician unfamiliar with the medical hazards peculiar to aviation. Aviators have also been known to take medication left over from a previous illness or even borrowed from a friend. *This is not smart!* You may be taking the wrong pill for your pains and in the case of an antibiotic, you may even be doing your bugs a favor by eliminating the weak ones. The hardy survivors of the antibiotic then regroup and you are worse off than you were before.

There are good reasons why you're not supposed to fly while taking an antibiotic. Penicillin, for instance, can produce early or late allergic reactions, including asthma, a most unnerving condition at altitude. The tetracyclines can cause nausea, vomiting, diarrhea, light-headedness and photosensitivity (extreme sensitivity to light). The streptomycins can cause nausea, vomiting and dizziness. If you are sick enough to have to take an antibiotic, then you are sick enough to stay on the ground.

Barbiturates – Barbiturates (sedative drugs) can produce initial excitement, then sleepiness, sedation and impairment of mental and physical activity. When you are taking a barbiturate you are often not adequately aware of the minor sedation existing during your recovery from the drug's effects – a state sometimes called drug hangover.

Antispasmodics – Antispasmodics which calm your GI tract down can produce dilated pupils and paralyzed accommodation (which means you can't focus your eyes and light blinds you). These drugs can dry up your mouth and cause difficulty in urination. They also can precipitate glaucoma.

Tranquilizers – Tranquilizers and aviation don't mix. The adverse effects produced by these drugs are numerous. (Your flight surgeon can identify these drugs by trade name for you.) The phenothiazine group can cause weakness, chilliness, constipation, stuffy nose, blurred vision, dry mouth and low blood pressure. They can also affect your central nervous system and cause internal organ damage. The propanediolcarbamate group may cause tremulousness, muscle relaxation, sleepiness, nausea, depression allergic reaction, intolerance to alcohol and withdrawal symptoms as well as certain blood changes.

Medication and Prohibited Drugs

Self-medication by aircrew personnel is strongly discouraged. Almost any drug or "pill" can at times produce untoward reaction or impair the coordination and concentration required in flight. Within 12 hours prior to flight, aviators should take no medication unless approved or prescribed by a flight surgeon. Flight surgeons shall indicate necessary flight limitations on all prescriptions provided to flying personnel. Medicines such as antihistamines, antibiotics, tranquilizers, sleeping pills, etc., obtained during an acute illness should be discarded if not all used during the period of medication. Sustained medication should be strictly supervised by a flight surgeon who shall make appropriate health record entries.

OPNAVINST 3710.7E, General NATOPS

Tranquilizers containing chlordiazepoxide can cause drowsiness, vertigo, ataxia or muscular incoordination (in dose over 50 mg. per day), syncope (sudden loss of strength or temporary loss of consciousness), itching, dermatitis, confusion and impaired thinking. As the *Navy Flight Surgeon's Manual* points out, "A certain amount of anxiety and awareness has a definite physiological benefit in a stressful situation. For this reason, tranquilizers may be quite dangerous when used in an aviation environment. A pilot should be able to appreciate, both rationally and emotionally, the risks of a particular course of action. Psychological testing indicates that use of tranquilizers may produce highly significant alterations of judgment and orientation to reality. Airmen should be removed from a flying status while using tranquilizers. It also may be advisable to continue the period of grounding for some time following the cessation of use."

Antimalarial drugs – The *Flight Surgeon's Manual* states that there is no evidence that chloroquine and primaquine have sufficient toxicity in recommended dosages to contraindicate their being administered to flying personnel under appropriate conditions. However, there are reports that antimalarial drugs may cause visual difficulties. For this reason, if you are taking these drugs you should report any symptoms to your flight surgeon.

In summary, self-medication is a potentially hazardous undertaking at best. In aviation it can endanger others as well as yourself and it can cost aircraft. *Flying and medication – especially medication which is not directed and monitored by a flight surgeon – do not mix.*

Life Lines

By Ray Starr, Safety Officer,
Naval Ordnance Laboratory, White Oak, Md.

Now that the days are shorter since daylight saving time has ended, we will be driving more often in darkness and during other conditions of poor visibility. It then becomes essential that you can see and that you are seen!

The following will help you see better:

- Watch for the glimmer of lights that tell you a vehicle is coming toward you, but is hidden by a dip in the road. Get a visual fix on the far side of the dip, so you will know where the road is during the partial blackout after your eyes meet the bright lights.
- Let a truck or bus up ahead screen out lights from approaching traffic. Maintain safe distance and watch the vehicle ahead closely! While he is screening out oncoming lights, he is also blocking your view of your lane. If he slows down or swerves his brake lights may be your only warning of a hazard ahead.
- Keep your headlights and windshield clean. You can't see properly through a dirty windshield. Wipe it off! Use a paper napkin, or get some paper towels from a service station. They do a great job! A little dirt on a windshield may not seem too bad, until lights from an oncoming vehicle highlight the stuff.
- Dim your instrument panel lights to lessen glare and to better allow your eyes to adjust to the dark.

As important as it is for you to see clearly, it is perhaps even more vital to your safety that other drivers are able to see you! Here are some ways you can help them –

- Put a strip of reflective tape across the rear of your car, as protection in case the taillights fail.
- Signal well in advance your intention to stop or turn. Get your turn lights on early (at sunset), so they will have a chance to compete with the blaze of advertising signs along the road. When stopping or slowing, pump your brakes to let the drivers behind you know that something other than that flashing beer sign is ahead!
- Parking lights do not give enough light for driving, even at dawn or dusk! Nor do they stand out to the other driver nearly as much as headlights. So, to help him see you at any time, and to help you see when visibility is poor, *use your headlights!*
- One of the most important times to be seen is when you are stalled on the pavement after dark. Of course, you should make every effort to pull off the pavement, but road conditions or the condition of your car might at some time prevent this. Warning flares or reflectors can then become vital safeguards against the chance of another vehicle smashing into yours. Place flares where they can be seen by motorists long before they come to your stalled vehicle from either direction. Keep parking lights on, along with emergency flashers if your car has them. Some drivers also carry a large white cloth to fasten to the back of a vehicle should it stall.

Generator Mystery Brought to Light

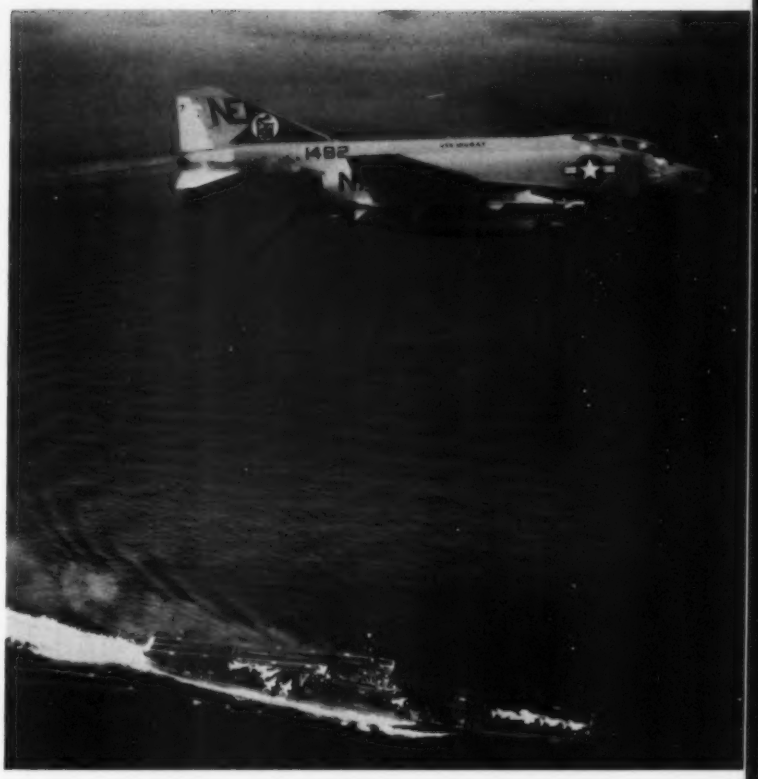
ELECTRICAL systems in the present generation of fighter and attack aircraft are very similar. So similar in fact that the two incidents which follow could have been in the same airframe or in the same model but actually were in two different types – one in an A-6A and the other in a F-4B.

A-6A

THE PILOT was returning to Homebase after a night carqual refresher flight and was cruising at 29,000 feet in light turbulence and rainshowers when the right CSD failed. Before the CSD could be disconnected both generators dropped off the line (reason unknown) but after the RAT (ram air turbine) was deployed the left generator was reset. The pilot looked at his VGI and saw that it was erect but was indicating 10 degrees nose-down and no OFF flag was in sight. By cross-checking other instruments he discovered that the VGI information was totally invalid. The aircraft was in a steep right bank with an increasing rate of descent, increasing airspeed and decreasing altitude. The pilot recovered from the unusual attitude at 22,000 feet utilizing his pressure instruments and the turn and bank indicator. The VGI still showed no OFF flag and indicated 30 degrees of bank and 10 degrees nose-down pitch. With no INS or VGI information the pilot made a radar monitored partial panel descent to VFR conditions and landed without further incident. After landing the pilot noted that electrical control of his cockpit seat operated in reverse.

F-4B

The pilot was in the vicinity of the ship at 2000 feet one morning using the Stab Aug (AFCS Engage OFF) when he experienced a large transient oscillation of the aircraft. About five minutes later he noted that the Master Caution and RH Gen OUT lights were illuminated. Before he could take any action the aircraft went into wild oscillations about all axes and lost 1000 feet before he was able to stop the oscillations by turning off the Stab Aug. The left generator had taken the load when the right generator quit since the RH Gen OUT light was still on and the BUS TIE OPEN light was out. The ADI was tumbling in pitch and roll and spinning in azmiuth, the HSI was oscillating ±40 degrees and the standby attitude indicator was tumbling. The pilot called the ship and requested immediate landing due to control difficulties. He reset the RH Gen but it failed a second time so he secured the switch. Other engine instruments and hydraulic pressure indicators were normal; so he did not shut down the engine. The flight instrument indicators which were completely unrelated to the actual aircraft attitude were disregarded. The pilot made an uneventful, shipboard, arrested landing in VFR conditions.



Investigation

In both cases investigation disclosed that the left generator had two phase leads (T1 and T2) reversed so that when the right generator failed and the left generator assumed the load in the normal split-bus operation the improper wiring caused a reverse phase current to the gyro motors for the attitude and direction indicators and the yaw, pitch and roll gyros in the Stab Aug/AFCS. This reverse phase current caused the three phase motors to electrically brake and drive in the opposite direction. Once this occurred all attitude instruments became erroneous and any control inputs or aerodynamic oscillations could have been amplified, rather than opposed, by the Stab Aug. Thus the Stab Aug, instead of augmenting the aircraft's stability, could almost completely destroy it (aircraft dynamic instability with resultant divergent oscillations upon displacement of the aircraft in any axis). In both cases it was impossible to determine how long the incorrect phase connections in the left generator had existed.

Prevention

In the past normal preflight procedures and available test equipment would not disclose a reverse current condition from the left generator. However, the seriousness of this malfunction has come to light because two "typical VF/VA pilots" safely landed their aircraft and good maintenance sleuthing put the finger on the cause. Both commanding officers in their endorsements stated "this incident is the variety that can be avoided." Here's how. After start and external power is disconnected, switch the right generator OFF. (NATOPS requires this in the F-4.) Two pieces of information can be derived from this action. One, whether or not the split-bus system is operating properly and the left generator can carry the applied load and two, it will indicate if properly phased power is available to energize the flight instruments and hydraulic transfer pumps (phase critical items). All other loads normally carried by the left generator are not believed to be phase critical. If the left generator is wired incorrectly the pilot's seat will reverse, the boost pump pressure will drop to zero and the flight attitude instruments will tumble or oscillate erratically.

Recommendations

One recommendation suggested redesign to preclude being able to hook up the leads incorrectly. Another was to install a sensor to detect this type of malfunction. Both recommendations have merit. In the interim a simple change to the MRC deck and the change in preflight procedures previously mentioned can easily detect a reverse phase generator.

CAPTAIN, Aircraft Commander, Plane Commander and Pilot are all titles used to identify *THE* man in command, depending on whether you're talking about a commercial carrier, military aircraft or general aviation aircraft. Regardless of what his title may be he's the one responsible for all of the details necessary to effect a safe flight. The following story reproduced from *Tech Talk*, ALPA's (Air Line Pilot's Association) Engineering and Air Safety Department publication, illustrates the point.

One of a Kind

Incident Report

On a flight from Memphis to New Orleans the first stop was Greenville, Miss. There was considerable thunderstorm activity in the vicinity of the Greenville Airport upon arrival. After a normal ramp stop, I taxied to the north end for a takeoff on runway 17. As soon as I lined the aircraft on the runway, it was apparent there was a heavy line of thunderstorms right off the south end of the runway. I had been advised by ATC prior to landing that the cells were moving to the northeast at 40 knots. I decided, in the interest of safety, to delay the takeoff until this condition passed over.

The storms hit about the time I arrived back at the ramp and practically inundated the airport. This condition moved across the airport in 20 minutes and we could have taken off at that time. However, I considered it paramount to check the runways, because from personal experience I knew they had inadequate drainage. I got one of the local firemen and one of the station agents to drive me down both runways to check runway conditions. At this time the water was so deep the vehicle drowned out several times during the drive on the runways. We agreed that there was more than one inch of water covering at least two-thirds of both runways, which was beyond limits for takeoff. After about 45 minutes, I had the fireman drive me back down both runways and there was still too much water for takeoff.

After several more rechecks of the runways, I estimated the water depth to be one-quarter inch average over the last third of the runway on the south end, and considered it OK for takeoff.

When I started takeoff on Runway 17, the wind was ESE at six to eight knots, and there was a very light drizzle. The V_1 speed was 122 knots and at approximately 119 knots, the master caution and master warning lights came on, accompanied by a complete loss of power on both engines and approximately 15 knots drop in airspeed. I immediately and simultaneously applied full brakes, closed the throttles and put the levers in full reverse as the First Officer deployed the spoilers.

Approximately 300 feet farther down the runway the engines relit giving me full reverse but the cockpit visibility dropped to zero, so I reduced some of the reverse thrust which gave us good visibility again. I then had to increase reverse thrust as the brakes did not seem to be effective. When the aircraft finally stopped, we had approximately six feet of runway left.

In summation, it is my opinion that if I had not gotten a relight on the engines we would not have been able to bring the aircraft to a stop on the runway. Until they have better drainage at this airport, I think airport personnel should give very close attention to the runways after any appreciable amount of precipitation has fallen, and relay this to flights operating through this station.

I think we were very fortunate in having an incident instead of an accident.

Now, friends, there is a pilot's pilot! One supposes that if every aviator, without regard to the color of his suit, were contacted and asked whether he had ever personally checked the condition of the runway prior to takeoff there would be few affirmative replies. Naturally operations duty officers and airport managers are excluded. We're just talking about any aviator waiting to go fly. One will get you five that most pilots don't give much thought to the amount of standing water on a runway, after a passing storm, let alone considering

Slush Depth	Dry Snow Depth	Increase in Distance
¼ inch	3 inches	6 per cent
½ inch	4 inches	15 per cent
1 inch	6 inches	50 percent
2 inch	10 inches	Infinite

Fig. 1

"The problem of slush on runways has become more important since the advent of jets because of the need for higher takeoff speeds than for props. Acceleration takes longer. Hydrodynamic forces increase due to water and slush on the runway and because high ground speeds operate in such a way that tires are lifted from the ground." NATO AGARD 500 - Problems Associated With the Presence of Water, Slush, Snow and Ice On the Runway. H. R. Herb (APPROACH Nov. 1968).

making a runway inspection. Yet, this incident report points out how important it really is.

Takeoff

There are not *one* but *two* aspects to consider in this incident. The first is the takeoff run and the second is the abort. Also it makes some difference if you are in a prop or jet aircraft. Prop and turboprop aircraft are not as critical as jets but you can bet a month's flight pay that the takeoff run in a prop aircraft is going to be considerably longer than normal with as little as one-half inch of water on the runway. Since winter has already arrived at some naval air stations and is just around the corner for most others Fig. 1 has been reproduced to indicate the additional distances for takeoff runs under various conditions.

Abort

Most pilots (prior to takeoff) compute their Go/No-Go figures and additionally may compute the distance to stop if a No-Go condition should arise. Just as with the airline captain in the incident report who did not reach V_1 speed (Go), the decision to abort is critical and you have to know how much concrete will be needed to stop that iron bird. First of all you must have friction and if there's one thing certain it is that any aircraft rolling along between 90-130 knots on a wet runway is in the region of hydroplaning and it will take something besides brakes to stop. The most effective use of brakes occurs at the peak coefficient of friction just prior to skidding or tire slip, but if you're in the speed region mentioned on water or slush there isn't any friction. Those "doughnuts" aren't on the runway; they're sliding along on a film of liquid. This means just that much more concrete you'll need until you decelerate below hydroplaning speed for your aircraft. Aerodynamic braking, reverse thrust and drag chutes all will help to slow you down as quickly as possible to the point when you can jump on the binders – and get results. Figure 2 which appears in the Procedures Section of the *FLIP Supplement* illustrates the terms and corresponding increases in landing roll under various conditions.

RCR (Runway Condition Reading)	Equivalent Braking Action	% Increase In Landing Roll
Air Force and ATC Facilities	Navy	
00-05	Nil	100 or more
06-12	Poor	99-46
13-18	Fair	45-16
19-25	Good	15-0

Fig. 2

It makes no difference whether landing or aborting; in order to stop you have to know how effective your braking action will be. The problem is having enough concrete when conditions are other than normal. As in all matters pertaining to performance and operation of aircraft, consult the applicable NATOPS manual for precise information. (A thorough discussion of abort procedures appeared as the lead article in the April 1969 issue of APPROACH.)

The momentary flameout that the captain of the airliner experienced (model unknown) was a rare occurrence but if it happened to him it can happen to you. The best insurance in handling an abort is preplanning. Assume on each takeoff that your bird will doublecross you and refuse to fly. If you are prepared for an abort the chances of successfully stopping, without any damage, are infinitely better than if you are caught by surprise. *Know* your aircraft's performance, *know* the distance required to stop and *know* what emergency procedures are necessary if an abort is required. An abort demands pilot skill and judgment – the utmost finesse in pilot technique. ◄

LETTERS

Chances are you'll only need seat belts once. But which once?

Velcro-Mounted Flashlight

FPO, San Francisco – In the interest of aviation safety I am forwarding pictures of an idea given me by APPROACH regarding velcro-mounted strobe lights on helmets for water rescues *("Notes From Your Flight Surgeon," January 1970 APPROACH)*. My idea is to mount a small, lightweight, rechargeable flashlight as a safety backup cockpit lighting aid. Anyone who has ever had to make a night IFR approach with interior lighting problems will see its usefulness. I have tried a "penlight in the mouth" approach on a black night in an F-8 and ever since I have been looking for a solution.

I have flown with this device (Figs. 1 and 2) in the T-2 and OV-10. I will not fly at night without it. In fact, I now carry two of these flashlights in my flight suit, day or night. One very conveniently fits in that little snap pocket inside the left thigh on the nomex flight suit. The other one I carry in my left-arm zippered pocket by day and mounted on my helmet by night. The flashlights I carry have two bulbs which can be selected separately with the light switch. You can paint one bulb red with fingernail polish and leave the other white. However, I have found that the clear bulbs do not present a night blindness problem on the few occasions during flight when I've needed the light. The light is handy in that it can be removed for reading approach plates and you can "slap" it right back where it came from. When attached to the helmet the light can be aimed with simple head movements, leaving both hands free. Can anybody come up with a better idea for the single-seat type pilot?

Fig. 1

Rechargeable flashlight with pile velcro tape glued to back with general purpose adhesive.

Fig. 2

Side view of light mounted on hook velcro on helmet.

One last thing, what safety hazards does this idea present? I do not consider it a "gear adrift" item in the cockpit any more than other types of flashlights. The light stays put and I've treated it to five positive G in the air (during daylight). I've violently shaken the helmet in the ready room. The velcro arrangement shown holds.

Of course the light will be lost in an ejection. This is the reason I carry a spare. I do not consider the light any more of an ejection hazard than the kneeboard. If time permits, a simple swipe and the light can be peeled from the helmet. Indeed, the T-2A/B/C ejection face curtain handle will do the same thing automatically with *no* interference to the ejection.

CAPT R. V. Sabia, USMC
VMO-2, Danang AB, RVN

● Good show! Basically your idea is sound. The only problem our personal survival equipment people here at the Safety Center foresee is that a pilot who is less meticulous about his equipment than you might assume his light had a good charge until proven wrong. In addition, the light is not in the supply system and has to be purchased on the open market.

This type flashlight came up for discussion at an APSET (Aviation Personal and Survival Equipment Team) meeting last spring. A Naval Air Systems Command representative at that time stated that this type of light is authorized as an interim measure pending final solution and agreement on a new type of portable utility light being developed by the National Bureau of Standards.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Wet Suits

NAS/CVS Anyplace – When the established routes fail to produce anything but bogged-down-itis, I assume it's time to go to someone who will respond outside the established administrative chain of command. I'm sure you've encountered similar subjects and associated problems which just can't be pushed through due to low priority and/or twilight tour officers' lethargy in cog positions.

The subject is wet suits. These have caused more concern and generated more misinformation regarding their authorization and procurement than a good many other less critical items of personal equipment. No, I can't staff it for you; I've tried and it winds up in the proverbial chasing-your-tail routine.

Some years ago (five or six?) a local VS RAG experimented with wet suits as an alternative anti-exposure garb for S-2/C-1 flight personnel. The Mk-4 and

Mk-5 suits really are very bulky and cumbersome, detract from crew efficiency even with venting, are prone to damage during post-ditch aircraft egress and are equally prone to damage during movement to bailout stations. The program ran in fits and starts but some approval and outfitting for VS squadrons has occurred – to the point where this unit is fully configured with wet suits for all flight personnel.

The problem is, what follows? We're committed and find that the system has now dried up. No more funding for wet suits. Since this is a personal item, the suits tend to migrate away with personnel turnovers. The Mk-5s are available but are we supposed to regress to them and operate the aviator's equipment branch with a split bag of wet suit/Mk-5 maintenance capability?

To my knowledge there is no guidance on how the wet suits are to be managed as far as personal equipment accountability. Log books? Okay for pilots but what about enlisted aircrewmen? Should these be migrating away as personnel leave the squadron or is the plan to retain them at the squadron and hope the next flying type who walks in is "about" the same size as the one who left? This puts the "PRs" in the apparel remodeling business.

We haven't been able to generate the answers to these questions and I'm sure that they are not isolated to this particular squadron.

I regret to admit that our great Navy can't come up with some direct and simple answers and further regret that the anonymity route has to be tapped but we could sure use some answers – preferably before the weather turns too much colder.

Anypilot

● Would you believe that your letter arrived in the same mail as NAVAIRSYSCOM speedletter AIR-5311/1137:LIW of 16 Sep 1970 which answers most of your questions? Here's what it says:

ASO (Aviation Supply Office) has advised that deliveries of the new production model of the ventilated wet suit assembly are not expected before the spring or summer of 1971. New procurements will be on an improved model (Type CWU-33/P) which will use thinner and more flexible foam insulation and incorporate a removable nomex outershell cover. Type CWU-33/P ventilated wet suit has been established as a new standard item of supply pending phaseout of existing Mk-5A stocks on an attrition basis.

The speedletter gives the following information for planning purposes for upcoming winter anti-exposure deployments:

"a. Mk-5A anti-exposure assembly should still be issued pending deliveries of new standard ventilated wet suit production models. Adequate Mk-5A stocks are available except size 38 short (FSN-RD-8475-839-90142XIX) according to ASO message 291801Z Jul 1970 to COMANVAIRPAC (NOTAL).

"b. All sizes of evaluation model ventilated wet suit assembly (AS 1429) currently on hand should be judiciously utilized by those units preferring ventilated wet suit in lieu of Mk-5A. Strongly recommend this ventilated wet suit be reissued under control of Aviation Physiology Training Units to ensure that proper sizing and fitting procedures are followed.

"c. For any minor ventilated wet suit fit or customizing adjustments, adequate supplies of neoprene foam sheeting (FSN-RM9320-180-9915LXIX) and adhesive (FSN-RM8040-440-5603LXIX) are available through regular supply channels.

"d. Change one to NAVAIR Manual 13-1-6.7, Aircrew Personal Protective Equipment, (contains) complete instructions for ventilated wet suit use, customizing, maintenance, repair, etc.

"e. Local purchase of replacement Rhovyl Clevyl T underwear to be worn with the ventilated wet suit coverall is recommended. (This is) available direct from the David Clark Company, Worcester, Mass. The following manufacturer's part numbers apply:

Size	*Undershirts*	*Drawers*
Small	*10878G01CA*	*10878G05CA*
Medium	*10878G02CA*	*10878G06CA*
Large	*10878G03CA*	*10878G07CA*
XLarge	*10878G04CA*	*10878G08CA*

The last underwear contract price was quoted at $4.50 each item."

As far as control of the ventilated wet suit, the suit should not go with an individual when he is transferred but should be turned in to the squadron since the squadron is accountable for it.

Correction

We wish to correct an error which appeared in the November '70 issue of APPROACH. The article titled "Hydraulic Systems Contamination" was adapted from material whose source should have been listed as Rear Admiral N. O. WITTMANN, USN, COMNAVAIRPAC Force Material Officer. Admiral Wittmann's name was incorrectly spelled in the credit box preceding the article. Our apologies for the error and thanks once again for the excellent material on hydraulic systems contamination. – Ed.

Vol. 16 **approach** No. 7

RADM W. N. Leonard
Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Contents

Departments

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Credits

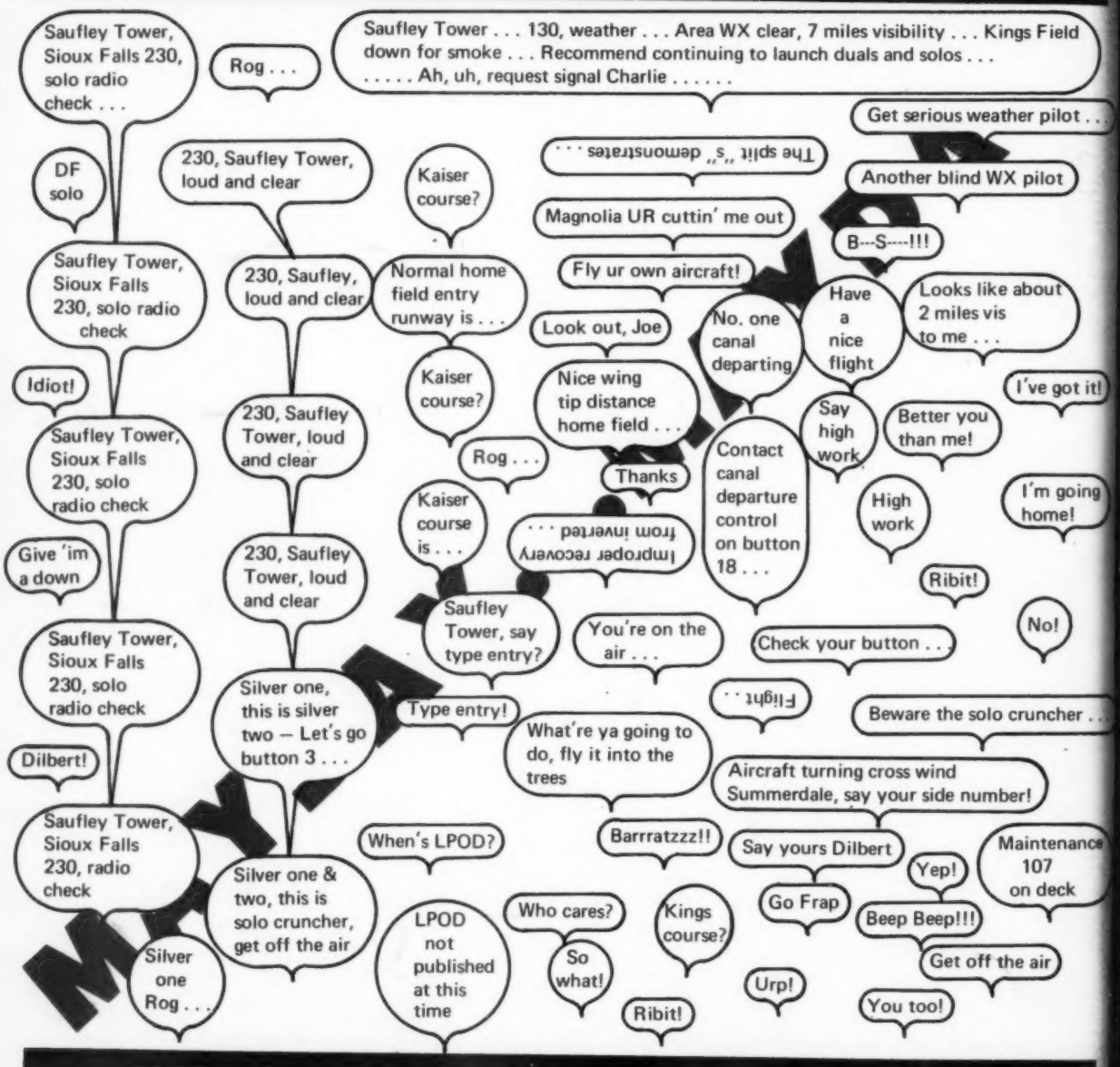
To the rescue! Cover artist Blaké Rader renders a fitting tribute to the men who fly the Navy's UH-2 throughout the world performing legendary feats of courage and daring. **Pg 3** Illustration: Don Lips. **Pg 28** Photo top left: Art Schoeni, center left: AME3 Steve Anderson. **Pg 29** Photo: Art Schoeni. **Pg 30** APPROACH diagrams: Don Lips.

Amen*

* ABROGATE MAINTENANCE ERRORS NOW !

Idea contributed by PRCM G. C. Kikos, USN

Radio Discipline



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